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THE BUSINESS OF WAR

BY THE SAME AUTHOR

THE WAR AFTER THE WAR
THE REBIRTH OF RUSSIA

THE BODLEY HEAD



Photo Vandyk

J. C. Cowans: Lieutenant General
Quartermaster General U.S. Army
1918.

THE BUSINESS OF WAR

BY
ISAAC F. MARCOSSON

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TO
THE BRITISH ARMIES EVERYWHERE
BUT TO THOSE HEROIC LEGIONS IN FRANCE IN PARTICULAR
THE AUTHOR DEDICATES
THIS BOOK
IN UNFORGETTABLE REMEMBRANCE OF THEIR
COURAGE AND COMRADESHIP

FOREWORD

IN the glamour of battle heroism the world loses sight of the mechanics of war. It is more thrilling to have an emotion about a forlorn trench hope led to victory than to hear about a supply column that reached the front under a storm of shells. Yet the courage of the teamsters who face death with only the reins in their hands is fit to rank with the valour of the fighting men armed with guns.

War has become a business. It is the world's supreme task at this moment. "Business as usual" has gone into the scrap heap along with many other illusions that clogged effort and begot a costly optimism in the early days of the conflict. The one definite work of civilization is to win the war. The path to victory is through organization.

No military establishment presents such a picture of close-knit endeavour as the British Army. The immortal First Seven Divisions who dashed to the relief of Belgium and laid the first Anglo-Saxon sacrifice on the Altar of Freedom were the nucleus of the mighty host on which the sun never sets

to-day. In less than three years Britain has created an institution out of cheerful service which has blocked the German machine that was forty years in brutal building. It is the precedent for our own gallant legions now in the making.

No phase of the British Army is more complete in its system than Supply and Transport. By the natural circumstance which always subordinates the prosaic to the spectacular it is the least known. Its heroes are unsung; its deeds are not often rewarded. Yet the Army Service Corps is the uncomplaining beast of burden that carries on its back the where-withal to live and fight. Its Victoria Cross is the consciousness of high and incessant devotion.

In former experiences with the British Armies in France I have seen the Supply and Transport only as a necessary incident in the life and death struggle that raged from the Channel to the Somme. Lately, however, I made a special journey to study it at first hand. I have talked with its organizers and its doers; I have followed the food and equipment from the time it was contracted for until they reached the men in the firing line.

In my work I have been one of the historians of so-called Big Business; in this war I have been with the five seasoned Allied Armies and also with the American Expeditionary Force in France. It is no depreciation of any of them to say that the British organization for the supply of its fighting men is in many respects the most amazing business institution that I have yet seen.

Britain's way has been the scientific way. She has made the business of war the prelude to an orderly, efficient and constructive peace. The War has become an immense training school for The War After the War.

I. F. M.

LONDON, *June* 1918.

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THE BUSINESS OF WAR

THE BUSINESS OF WAR

I

WAR AND BUSINESS

A BROAD-SHOULDERED, deep-chested man, with keen blue eyes and an unyielding jaw, the breast of his khaki tunic ablaze with service and order ribbons, sits at a flat-topped desk in the War Office in London with his finger on the pulse of the most remarkable business machine in the world. Before him each morning is laid a sheet of paper less than a foot square, on which is typed the feeding-strength of all the British Armies—man and beast—in every theatre of war, together with the precise quantity of food, fuel and forage available for them. On another sheet is a compact summary of all supplies contracted for or speeding on ships and trains towards the zones of distribution and consumption. At a glance, therefore, he can appraise the situation on which victory in the field stands or falls.

Although aloof from combat, this man controls the arteries through which pulses the very life-blood of war, for he is Lieutenant-General Sir John Cowans, K.C.B., Quartermaster-General to all His Britannic Majesty's Forces. He feeds, clothes and supplies a khakied host equal to the population of Greater New York; under his command are enough horses and mules to operate all the farms in Iowa. He renews

and keeps going a fleet of mechanical transport that would duplicate more than one-sixth of all the commercial motor vehicles in use in the United States. In a word, he is Managing Director of one vast branch of the stupendous Business of War.

There are dozens of British Generals better known to the average man in England than General Cowans, but none, not even Field-Marshal Sir Douglas Haig himself, has a more important task. Without the "Q.M.G."—as the Quartermaster-General is commonly known—there would be no big offensives in Flanders, Egypt or Mesopotamia; indeed, no advance anywhere along the bristling British battle line that stretches from the English Channel to the shores of the Mediterranean. His work is the work preservative of war. About it is no glamour of spectacular performance; no thrill of battle heroism. It unfolds no panorama of grim and glorious deed. But it furnishes the real fuel of war; it stokes the mighty human furnace that forges the Hammer of the Hun.

Unsung and often unrewarded by the honours that go to troops of the line, the Army Service Corps, which mans the legions of Supply and Transport, can fight as well as feed. It takes a higher courage to drive a motor-truck where shells are falling than to operate a machine-gun under fire. The record of the Army behind the Army is a continuous narrative of unflinching bravery shot through with a valour that is full brother to the efficiency of the Corps. A squadron of motor-trucks laden with food charged and routed a troop of German Uhlans in the retreat from Mons; at the first battle of Ypres, cooks, orderlies, farriers, chauffeurs, and even battalion clerks swelled the long thin line of heroes that checked the Kaiser's march to the sea.

There has never been a day since the immortal First Seven Divisions dashed to the relief of Belgium that Thomas Atkins has missed a day's rations. He has had them served hot and plentiful amid all the stress and storm of flying death. Day and night, up and

down the hell-swept roads, and regardless of the terrors that lurked in land and sky, the food has always come up. No matter how the tides of battle ebb or flow, man and beast must be fed. Break the lines of food communication and all is lost.

But this immense operation is not without a romance all its own. The endless chain of army supply, geared as it is to the most incessant and unfailing of all demands—the appetite—has annexed the whole world of output. It reaches to the waving wheat domain of the Argentine, to the fleecy cotton belt of our own South, to the rolling oat realm of Canada, to the dripping oil-fields of Burma, Mexico and California. Into its hungry channels flow the products of the vats and tanks of Chicago's Packingtown; the benches and mills of New England; the canneries of Australia. All lands and all flocks are stripped for its needs. It has recruited a host of workers as huge as the battling armies it sustains, to the insatiate end that the Wheels of War be kept whirling.

While it involves millions of men, requires an expenditure of billions of dollars, taps the entire universe and provides a continuous procession of supplies, it is dominated by one man who can sit at a desk in a far-away office, the absolute centralization of the whole ramified activity. How is it possible when the seven seas have become the graveyards of transport; when human life is as a candle in the wind; when half of mankind is bent upon destruction?

The answer is easy. It all results from the fact that the Business of War as represented by the Supply and Transport of the British Armies is nothing more or less than a colossal piece of merchandizing that has become a triumph of standardization. What scientific efficiency experts have preached to American factory owners for application to the arts and crafts of peaceful pursuit has here reached the last degree of practical interpretation for the maintenance of the War of Wars. It expresses the genius of organization of a hundred

United States Steel Corporations, Standard Oil Companies and International Harvester Companies rolled into one. It is a super-corporation, knit by iron discipline, fed by fire and driven by an energy that would kindle and keep an Empire. Apply it to a purely commercial enterprise and it would yield a well-nigh fabulous profit.

Yet the men who operate it are in the main soldiers who grub at prosaic desks, battling each day with questions of raw materials, overhead costs, production, transportation and distribution. Although unlimited financial credit is behind them, they must account for every dollar they spend. In providing for the battlefields of war they parallel nearly every problem of the battlefields of business. War, as waged to-day, is merely bitter and bloody competition between nations. In the operations of an army in the field you have, for example, the working out, with men and guns, of the most difficult and costly of all industrial items—Distribution. So, too, with Supply and Transport, which is just another kind of Distribution made possible by invoking every rule of the business game.

Study the system and you will find the whole armament of scientific trade warfare. You will encounter charts and diagrams of office and staff organization that will apply to any money-making establishment regardless of output. In the "follow-up" of army supplies you will see that every tin of jam is traced to the ultimate fighting consumer. You will discover processes of economy that "turn over" John Bull's taxes half a dozen times although originally intended for a single outlay. You will meet with battle salvage that redeems the debris of war, ranging from the nails in a timber trench support to a twelve-inch gun. Under this drive for war commodities new industries have been created and old ones revived. A gigantic mechanism has been set in motion that, while dedicated to war, is paving

the way for a more efficient, a more orderly and a more economical peace.

Victory in the war may or may not lie in the kitchen, but no one can deny that it is very likely to perch on the banners of the best-fed armies. From Darius to Napoleon the empty stomach has been first aid to defeat. "Many can lead troops; I can feed them," was one of Wellington's proudest boasts.

It was a hard job to feed soldiers when they were numbered by tens of thousands; it is infinitely more difficult now that they are reckoned in units of millions. There was a time when invading armies lived on the lands they occupied. Fancy the fate of Haig's hosts if they tried to subsist upon Flanders and Northern France! But War, like Life, is a constant evolution. Hence the transition from plunder to preparedness; from the era of grafting sutler and unscrupulous army contractor to the present-day procedure that has made a perfect art of the commissariat.

Clearly to understand the system of Supply and Transport ("S. and T." as they call it in the army), you must first get the active army organization fixed in your mind. There are two grand divisions. One is Operations, which has solely to do with strategy and fighting. It is controlled by the Imperial Staff, whose Chief is General Sir William Robertson. Its tools are men and guns.

The other is Administration, which is charged with the task of keeping these men, their guns and their transport fed, fueled and equipped. At the head is the Quartermaster-General. He not only provides that the men and horses eat, but purveys the whole mechanical transport. He likewise furnishes all the wood, coal, disinfectants and medical comforts needed by the armies.

There are two kinds of supplies: essential articles, like tinned and preserved meat, bread, biscuits, flour, jam, tea, sugar, butter, bacon and condensed milk; and non-essentials, like fresh meat and vegetables.

The number of supply items for the British Army has grown to an almost incredible extent. In the Crimean War only three articles—flour, meat and vegetables—were issued to the troops. In the Boer War there was an increase to forty-five. To-day the Quartermaster-General has exactly four hundred and fifty on his list !

If the Quartermaster-General's work was confined to subsistence and fuel for man, beast and vehicle his labours would be comparatively easy. But linked with his task is the sponsorship of what is termed Ordnance and Equipment Stores. To the ordinary men the word Ordnance simply means goods of all kinds. As a matter of fact, in the British Army the phrase Ordnance Stores covers nearly eight thousand items, ranging from an axe to a mess tent that will shelter a circus. The principal stores, however, are camp equipment, clothing, shoes, underwear, blankets, shirts, harness, saddlery, trench tools, oils, paints, chemicals, ironmongery, furniture of all kinds, huts and the materials for the repair of all these articles.

Still a third detail of Administration deals with the question of Remounts, which means the renewal of horses. Both Ordnance Stores and Remounts have their own Directors, who work in conjunction with the Quartermaster-General. The only important equipment used by armies not supplied by the Quartermaster-General is arms of all description, guns and gun carriages, vehicles, telegraph and telephone stores and ammunition, which are all provided by the Master-General of Ordnance, whose chief source of supply is the Ministry of Munitions.

The big difference between food supplies and ordnance stores is that one can wait and the other cannot. Guns, for instance, do not have to be fed regularly, but soldiers and horses cannot go a day without sustenance. Hence the Supply machine can brook no delays or breakdown. Interruption spells disaster.

Here, then, is the situation. Roughly speaking, five millions of British soldiers are training at home, or fighting, or being held in reserve in France, Mesopotamia, Egypt, Salonika or Africa. They must have three meals and their tea every day; their clothes, boots, underwear and equipment must be kept in good order and renewed at regular intervals; their horses, mules and motor-cars must also have the wherewithal to live or to be used. In short, the British Army must be maintained as a going and effective concern.

Some of these troops are five thousand miles from the original source of their supplies; nearly all their food and commodities must run the gauntlet of the seven seas, where hides the deadly peril of the submarine. Besides, immense details of troops are being constantly shifted from place to place; in some quarters ranks are thinned; in others they are steadily and sometimes suddenly increased. How then is the vast task of supplying them achieved?

Let us begin at the beginning. You cannot distribute food and materials for these far-flung millions without assembling at first. Furthermore, you cannot mobilize supplies without knowing what and how much you want. Hence the corner-stone of the immense structure that we are about to explore is really need as expressed by the army contract.

Formerly all British Army contracts were made by the Director of Army Contracts at the War Office. He was a Civil Servant and, therefore, not a soldier. As the armies swelled from hundreds of thousands to millions, and as the enormous demands for food and supplies began to test and tax the sources of raw and finished materials, it became apparent that only trained and seasoned business experience could successfully cope with a situation that threatened to be acute and costly.

Early in 1917 the whole scheme of War Office Contracts, which means the provision for all the

British Armies, was placed in the hands of Mr. Andrew Weir, a civilian. He is a hard-headed, large-visioned, self-made Scotchman, a shipping prince whose boats are known in nearly every port, and whose name is almost as familiar in New York as it is in London. The ancient title of Surveyor-General of Supply was revived for him.

Mr. Weir is a member of the Army Council, composed of the Chief of the Imperial Staff, the Quartermaster-General, the Adjutant-General, the Master-General of Ordnance, the Director-General of Military Aeronautics, the Director-General of Movements and Railways and a Financial Secretary. This Council runs the war so far as the British end of it is concerned. At the head of it is the Secretary of State for War—the post that Lord Kitchener held at the time of his death—which corresponds to the Secretary of War in our Cabinet, but with larger powers.

We can now proceed to translate the whole system of Supply and Transport into the simple terms of trade. The Surveyor-General of Supply is the Producer; the Quartermaster-General is the Distributor; the Army is the Consumer. The only difference between this business and a regular business pursued for profit is that with the former no selling campaign is required. All the output is sold before it is produced.

Being a business man, Mr. Weir looked upon his new work in the light of an industrial enterprise. He immediately organized it just as if he were going into the business of war supply for the rest of his life. He knew nothing about war, but he assumed (and not without truth) that the principles that had made him a successful man of commercial affairs would apply to any other undertaking. With the organization of the department of army contracts, you strike the first line of scientific defence that approved trade methods have reared above the subsistence of the British Armies.

To the everlasting credit of the British soldier let



From a Drawing by Percival Anderson

ANDREW WEIR,
SURVEYOR-GENERAL OF SUPPLY

it be said that he welcomed the innovation. The old enmity between regular and civilian was at once wiped out. The soldier realized that this war has become the biggest business of all time. Contact with life and business brains and elastic business experience has stimulated his imagination and developed his initiative. The old-time administrative soldier was the slave of red tape ; all his thinking was done for him ; everything was by precedent. The men of the Quartermaster-General's Department under this new association will be masters of trade technique, equipped to run any business job when the war is over.

When you go into the office of the Surveyor-General of Supply you think you are in the board-room of a great corporation. On the walls, for example, hang the diagrams so familiar to American industrial establishments. Unfolded on a table is the master chart that tells the whole story of army supply from the contract's end.

At the apex of what we in the United States call the pyramid of organization is the Surveyor-General of Supply, who corresponds to the President and General Manager. Next in rank comes the Advisory Board, consisting of the Quartermaster-General or a representative ; the Master-General of Ordnance or a representative, the Finance Member (The Watchdog of the British Treasury) or a representative ; and three civilians, who are Lord Pirrie, chairman of Harland & Wolff's, the famous shipbuilders, and one of the largest employers of labour in England ; F. Dudley Docker, the George Pullman of England, and builder of the first " tanks " ; and P. H. McClelland, a shipping wizard and all-round man of business. The Assistant Surveyor-General of Supply, Mr. Austin Harris—another captain of capital—is an ex-officio member. This Board, I might add, sits every day on the business at hand, just as the board of directors of the Standard Oil Company convenes every morning. It knows precisely what is going on all the time.

These civilians emphasize one of the most significant phases of the whole supply contract scheme. It lies in the fact that in every domain that spends money for the army you find what Mr. Weir calls "commercial members," men recruited without pay from the business world, who pass on the economic and financial merits of all propositions. In this arrangement is one of the many valuable lessons that our new and growing military establishment may learn from the British.

The work of the Surveyor-General of Supply is divided into three main branches—Demands, Contracts and Administration. Since the word Demand will appear frequently in this Chapter and others to follow, it may be well to explain just what it means. A Demand is the itemized statement in terms of pounds, cases, tins, gallons, garments or bushels of an army's needs. It may be a single typewritten sheet or forty sheets. In the case of ordnance stores for a unit like a battalion, battery or a brigade, the list is printed in book form and called a Mobilization Unit Table. The demand is made up in the field by the Director of Supply and Transport attached to each army. There are five complete British Armies comprising the Expeditionary Force in France. He knows just how many men and animals he must feed; how many trucks, cars and motor-cycles he must supply with petrol and spare parts. Since forces are being shifted and changed constantly a new Demand is made up each month. The Demand becomes the Food and Supply Budget—a definite thing to do business for and with.

You get some idea of the scope of British Army Supply provision when I say that since the beginning of the war the value of purchases made by the contracts branch alone has aggregated \$3,750,000,000; that the annual gross outlay now is something like \$1,750,000,000, and this does not include guns, ammunition, aeroplanes or mechanical transport.

Among the purchases during the war have been 105,000,000 yards of cloth, 115,000,000 yards of flannel, 400,000,000 pounds of bacon, 500,000,000 rations of preserved meat, 260,000,000 tins of jam, 167,000,000 pounds of cheese, 35,000,000 knives, forks and spoons ; 35,000,000 pairs of boots, 40,000,000 horseshoes and 25,000,000 gas helmets.

Looking at this enormous outlay from another angle, the British Armies in France alone each month require 95,000 tons of oats, 4,000,000 gallons of gasoline, 20,000 tons of flour, 10,000,000 pounds of jam and 75,000 tons of hay. Ponder on these figures, and you begin to think that Demands are written on ten-league canvases with brushes of comet's hair !

Having seen what a Demand is, we can proceed with the specific job of the Surveyor-General of Supply, which is to see that contracts are let for the items set forth. This brings us to the Demands and Contracts Divisions.

Let us take Demands first. They are divided into five sections : Stores, which comprise all engineering equipment, timber and hardware ; Supplies, which embrace all food and fuel ; Works Supplies, such as building and trench material ; Clothing ; and Medical Stores.

Each one of these Demands branches has a Supply Committee, which includes a Commercial Member (the inevitable link with business), a representative of the Quartermaster-General's Department concerned with this specific article (it may be food or clothing), and who is known as the Demanding Officer, and a representative of the Director of Army Contracts. The post of Director of Army Contracts survives, but it is subordinate to the Surveyor-General of Supply. Thus the Supply Committee becomes a miniature organization of experts which concentrates upon one group of supplies.

Since we have reached the liaison (as the army phrase goes) between the Quartermaster-General's Depart-

ment and the Surveyor-General of Supply it is important that you know just how this former organization is constituted. Henceforth, and until the food and supplies reach Tommy in the trenches, you will find some member of the force in evidence.

You have seen how the Quartermaster-General, Sir John Cowans, sits in his office at the War Office, head of the whole distributing machine, and knowing every hour just what the British troops want and what they have. Under him are two separate units. One is that part of his organization that works at desks in the War Office and throughout England, America and wherever the British Army buys or makes supplies; the other is an exact replica in the field from Quartermaster-General down. There is a complete organization in France and smaller ones in every other theatre of war. For the purposes of the present article we are concerned with the contingent in England.

The Quartermaster-General to all the Forces is really the Andrew Carnegie of the supply corporation. Like Carnegie, he has the ability to select and keep capable associates and subordinates. First down the line (and in the office next to him) is the Director of Supply and Transport, Major-General A. R. Crofton Atkins—"Tommy Atkins" is what his colleagues call him—titular head of the Army Service Corps, and a many-sided individual, who combines the authority of the soldier with a rare genius for organization. If he had gone into trade in England he would have been another Lever or Lipton; in America, Marshall Field and John Wanamaker would have been his rivals.

Under him the British supply machine, built to meet the needs of 168,000 men (the old regular army), has stood the strain of every demand that this war has made, which means that it has provided for five millions. It is still going strong. In General Atkins' office is a chart which sets forth in pyramid fashion the work of every branch of the Quartermaster-General's



From a Copyrighted Portrait by Percival Anderson

MAJOR-GENERAL A. R. CROFTON ATKINS
DIRECTOR OF SUPPLY AND TRANSPORT AT THE WAR OFFICE

Department. The smallest *abattoir* in the department of meat supply is fixed on it.

Every branch has a number and an executive head. Take Food Supplies. It is technically known as "Q.M.G. 6," and is headed by an Assistant Director of Supplies, Colonel H. F. P. Percival, who has his own staff. Each branch, in turn, has various subdivisions indicated by letters such as "Q.M.G. 6 A," which has to do with the organization of Base and Main Depots ; fixing reserves of food to be held in the field ; provision of meat stuffs, military butcheries, cold storage and refrigerators ; supply accounting and relations with the Food Ministry.

"Q.M.G. 6 B" deals, among many other things, with one of the most difficult of all problems—gasoline ; "Q.M.G. 6 C" with co-ordination of all demands from the field and all questions affecting the shipment of supplies (the allocation of tonnage is an immense problem), and so on. I merely cite these typical duties to show the immense scope of the department. There are eleven of these numbered branches, each with many subdivisions, yet all are joined by a teamwork that is one of the wonders of the organization. None of the activities clash. Each unit has its rigidly defined task. Linked together, they make a marvellous machine.

By this procedure you can understand how easy it is for the Surveyor-General of Supply to have a competent Demanding Officer from, let us say, "Q.M.G. 6" on the Supply Committee which deals with Food Supplies. In this concrete case the Demanding Officer is the one who receives the Monthly Demand from the Director of Supply with the overseas armies.

Now we can go into the matter of Contracts. The Demands Division has already made known the needs of the armies. For staple supplies like jam, tinned meats, biscuits, flour, sugar and potatoes, which can be bought in big bulk, and for articles to be manu-

factured, the Surveyor-General of Supply must get the Demand three months ahead so as to enable him to place orders in America, Australia and Canada.

In order to co-ordinate the work between Demands and Contracts Branches there is a committee in the Contracts Department to correspond with every Supply Committee in the Demands Section. Likewise there is a General Supply Contracts Board headed by the Assistant Surveyor-General of Supply.

It is in the Contracts Branch that you find the commercial domination of war supply at its height. In the economies effected, the controls established, the mobilization of materials achieved, you get the full dramatization of business efficiency. Under its constructive influence the army contract as created by this war has been purged and sterilized. Instead of a juicy plum to be plucked by the despoilers of the people's money, it has become a definite business-like document safeguarded and supervised at every turn.

In normal times Government purchase in England is by public competitive offering. Where the needs of the army form a relatively small part of the available production of the country, and where, as a result, there is effective and healthy competition, this method is the best means to secure satisfactory supplies at reasonable prices.

The tremendous demands of this war upset all these conditions. The resources of many trades and industries began to be taxed. The gouging of the Government began. But John Bull did not long stand for this sort of thing. As early as June 1915, when the industries began to feel the strain of the unprecedented production, the system was inaugurated of requiring contractors to justify their quotations of price by the submission of costs, or what the English call costings. It limited profits to a reasonable degree and wiped out the effect of the artificial market conditions produced by the abnormal military demands.

But this procedure had no statutory authority. It

was purely a matter of negotiation with individual contractors and trade associations. As the armies grew and the difficulties of supply increased, these more or less amiable methods were found to be ineffective.

John Jones, the manufacturer, capitalized his advantage and exacted his pound of flesh. Rotund as he is, John Bull declined to stand for the extortion. Fangs were put into the Defence of the Realm Acts, with the result that a firm's output could be requisitioned by the Government and a price fixed on a basis cost of production plus a reasonable profit on a pre-war standard. These powers have been widely used both by the War Office and the Admiralty. The mere fact that they exist is a bulwark to the public purse.

Here is the way it works. Let us assume that the War Office through the Surveyor-General of Supply gets a bid for overcoats at \$10 apiece. "All right," says the Supply Board, "we will accept that bid subject to costings." Accountants are immediately set to work upon the contractor's books. If it is found that the price is excessive the factory is commandeered and run by the Government. This whip-hand over extortion has had the effect of reducing the prices of all war commodities.

The system in vogue for keeping a check on the contractor is very simple. A staff of skilled investigators visits the plant and checks the details of material used from the actual invoices; of labour employed from the wage books; of overhead charges from the trading and profit and loss accounts and of profits from the pre-war rate, the present turnover and the amount of capital employed. Thus there is no way for the contractor to escape absolute and complete scrutiny and censorship.

The savings effected in the purchase of Miscellaneous Stores (hardware, horseshoes, brushes and similar articles) will show the beneficent effects of the system. During the twelve months ending April 30 last

the cost of contracts for these stores was \$42,500,000. These costs were investigated under the Defence of the Realm Acts and reductions to the value of \$2,000,000 made. On the first five million dollars the reduction was 9 per cent; on the last it was only 2 per cent, which shows that the era of extravagant and padded quotations is over. It is only one result of the business administration. War is indeed on a business basis.

But this enormous saving, which applies to practically every commodity, is merely one phase of the larger rehabilitation of the whole matter of army supply. As the demands of the armies increased it was found necessary to regulate production in all stages of manufacture down to the raw materials. Under the Surveyor-General of Supply a Director of Raw Materials was appointed in A. H. Goldfinch, a manufacturer of wide and seasoned experience. The material is either purchased by the Government or the transactions in it are controlled under the Defence of the Realm regulations. The conversion into the finished article is made on a basis of fixed price for each process of manufacture. The chief raw materials controlled now are wool, jute, leather, flax, hemp and semi-finished steel.

It was impossible to carry out such regulation without the aid of experts in the various industries affected. A whole new branch composed of trained buyers and manufacturers had to be established. For the provision of clothing, and including the purchase of the raw material, not less than one hundred technical officers are employed. Most of them are civilians who are given commissions and designated as "temporary officers"—who enter the service for the duration of the war. This same plan has been followed in connection with leather, jute and flax.

This all-important branch of army supply has a significance that reaches far into the future, and is not without its portent for America. The more

you see of it the more you realize that this is a war of materials of all kinds. So will be the War after the War. Germany will only succumb when she faces the exhaustion of the materials with which to wage the struggle. Upon it likewise depends her industrial revival of impotency.

England's organized control of raw materials not only strengthens her weapons of actual physical offence, but girds her up for the grilling days of peace, when bitter and bloodless trade competition will have full sway and when Raw Material will be King. But this is a look ahead. Let us see in the concrete terms of war economies what the control of materials has brought about.

Take wool. The world shortage was first felt early in 1916, and England immediately took steps to protect herself against excessive prices and to ensure an adequate supply for her military purposes. First of all she bought the entire clip for \$32,500,000. The purchase was made by expert wool buyers. The prices were fixed at 35 per cent above those obtaining in June and July 1914. High as this was, it was considerably lower than the market quotations at the time of the purchase.

As army demands, together with neutral and American demands, increased, the whole Australian and New Zealand clips were bought for \$175,000,000, which was 10 per cent lower than the prevailing price. The effect of these two operations was to concentrate in the hands of the British Government the bulk of the wool supplies of the Empire.

To economize transport, the raw wool is shipped direct to the manufacturer. The various agencies concerned in the processes by which it is converted into the finished product are compensated at a price based on cost of production plus a reasonable profit. In this work you get a gratifying example of co-operation, because farmers, manufacturers and trade union officials are called in to assist in the operation

of the scheme. The wool which is not required by the Government for War purposes is sold at market prices. Preference is given to the needs of the British export trade for the purpose of maintaining the foreign exchanges, and the prices are kept as stable as possible.

The control of British and Colonial wool has resulted in immense economies for the State. The effect of war conditions upon market prices of the raw material has been greatly minimized, even eliminated, while the fixed price of the raw material has enabled the War Office to control the cost of production at every stage. In actual money it has meant a saving to the Government of \$65,000,000.

Take leather. The army needs, as may be supposed, are enormous. Boots, harness, saddlery and leather equipment for the horses and belting for factories are required in huge quantities. During nine months in 1915 the Government bill for these supplies was \$75,000,000. This tremendous demand sent prices soaring, owing to the competition between manufacturers for the raw material. So John Bull got busy with another control. A statistical survey of the tanning trade was made and the visible supply of leather commandeered. Exports of leather were forbidden, and tanners were assisted to make purchases in South America. The fangs of the Defence of the Realm Acts were put into the whole business, which at once came under military direction.

The technical and trade experts attached to the Contracts Branch were given full play for their talents, and the whole leather industry took on a new scope and life. Among other things, kips for leather uppers were bought in large quantities from India. This operation became invested with a peculiar interest, because the trade was largely in German hands before the war. The price of leather produced from these kips is about 24 cents a foot, while that of the corresponding leather from British hides is 42 cents a foot. This whole control of leather has not only enabled

Britain to supply her war needs, but to provide for some of the requirements of her Allies. She made 7,000,000 pairs of boots for the Russian Army. It is estimated that the saving to the War Office has approximated not less than \$15,000,000. This is exclusive of the saving in the purchase of the Indian kips, where the economies are about \$6,000,000.

So, too, with jute, flax and hemp. The necessity for control in these commodities was caused by the immense quantities required by the army for sandbags and other jute bags, sacking, tent linen, general equipment, aeroplane cloth and rope. The Government prohibited all importation of raw jute and then requisitioned all unsold raw material in the country. This was followed by an equitable distribution of the supply among the spinners at a fixed price.

With flax a whole new agricultural activity was set in motion. Private import was prohibited and large quantities of flax seed were imported and sowed in the North of Ireland. The production of seed in Ireland, Canada and India was encouraged. It is an evidence of the growing desire of Great Britain to be self-sufficient during and after the war. As in the cases of wool and leather, huge savings have been brought about. The control of jute manufacture alone has saved the British Government \$30,000,000. In hemp the margin of profit for shippers has been reduced from \$175 to \$125 a ton. The estimated annual turnover on 70,000 tons has produced a combined profit and saving of \$5,850,000.

The temptation is strong to linger over more of these war economies for the reasons that they have such enormous meaning for America and her part in the war. The case of barbed wire is one in point. Only those people who have seen this war know that it is a war of wire. Northern France and Flanders are grim and rusty forests of barbed entanglement.

In 1915, when the war was getting into its stride, the British output of barbed wire had fallen to 250 tons a

week. The army requirements were four times that much. Barbed wire is produced from wire rods. Before the war most of this was secured from Germany and Belgium. The German product was the cheapest because it was a subsidized industry. This supply was automatically cut off by the war. The only source left was America, and the price and freight on her output rose skyward.

England thereupon set out to develop her wire-rod production. Steel billets were provided by the Ministry of Munitions, which controls all the available steel, and the furnaces began to roar. Before long the output had grown from 250 tons a week to 950. The Government reserves the entire output and allocates the rods among the various wire makers according to their requirements. Not only is the whole industry reorganized, but the usual big saving, due to control, has been effected. Where wire rods cost \$150 a ton in the open market the Government produces them at about \$72 a ton.

With tea—one of the mainstays of British life and a strong support of the Tommy—a tremendous economy has been effected by cutting out the middleman and transmitting the raw material direct from producer to consumer. Formerly the tea was bought where it lay and collected by army transport for delivery to a bonded warehouse for blending and packing. It was then sent to the home supply depots or direct to France. This was costly and complicated.

The tea is now bought f.o.b. Calcutta and other places and sent without blending on Admiralty ships straight to the depots or to France in the original package. There is a big saving both in price and in shipping, handling and warehousing. The price paid under the old system varied from 20 to 22 cents a pound; under the new arrangement it can be laid down for 18 cents a pound. Considering that England is buying a total of 60,000,000 pounds of tea this year, you can see that it is a considerable item.

One more commodity—jam—will serve to show still another phase of the British war supply economy. Until recently the jam was bought by competitive bids. Now it is purchased under very unique auspices. Eight of the leading jam manufacturers have been formed into a Government Committee which buys all the fruit necessary for the Government supply. This prevents competition and a consequent increase in price. The firms are then paid for the actual cost of the fruit and sugar used; for the actual cost of delivery of the fruit and sugar to their works and of the finished jam to the military depots and for the actual cost of time and cases, plus 5 per cent profit if the manufacturers make their own cases. A fixed rate has been established for each 100 pounds. It is based on previous profits, and all manufacturers have been required to produce their books extending back three years before the war. Not only is jam cheaper, but it is greatly improved in quality.

I have cited these examples of supply saving to show that the conduct of the Business of War is as efficient and economical as any enterprise conducted for profit. What is equally important is this control procedure pointed the way to a post-war industrial regeneration that will make the British Empire a formidable world trade factor.

II

ARMY DEMAND AND SUPPLY

THE whole procession of army supply begins and ends with a contract. How is it made? Consult a chart in the office of the Surveyor-General of Supply and you can see the consecutive process from the time the Demand comes in from the War Area (the field), or the Home and other Stations, until the goods are actually delivered to the supply depot or the army units.

Every tender (or bid as it is known in America) invited (and exactly 204,985 were asked for during the last fiscal year) is on a form specially prepared by the War Office. The specification, be it for meat cleaver or hospital tent, is carefully drawn, duplicated by the hundred, and sent with the blank tender form to the bidder.

At this point you naturally ask: How is the Contracts Branch to put its finger at once on available bidders? Go to Imperial House in Tothill Street, in London, and you will find out. In this immense establishment, which houses the thousands of clerks of the Contracts Department, you will discover a card index containing the names of 70,000 manufacturers or dealers. These firms are in every neutral or allied country, but mainly in Great Britain, Canada, America and Australia. They can produce anything that the British Armies want. When the armies cannot get what they want from some outside concern they make it on their own.

If, for example, bids for biscuits are desired, you simply turn to the cards marked "Biscuits." On them you will find the names of every available biscuit-producing establishment in Great Britain and the United States. More than this, you will find a record of every contract that the firm has had with the British Government ; the date and the price.

Hence all that is necessary is to send blank tenders with specifications or samples to every biscuit firm on the list. In order to get the widest competition, and to encourage all British firms to compete for army contracts, samples and specifications are sometimes sent to Boards of Trade with a view to interesting their members.

All bids are opened by a Tender Board, consisting of the Director of Army Contracts, a representative of the Financial Department and a representative of the Quartermaster-General. If it is a matter of food the latter will be Q.M.G. 6.

Once the contract is made it is followed through every process of manufacture. It is under constant scrutiny from inspectors and "speeders up." If a contractor lags behind in his order or defaults, the Government buys the article contracted for elsewhere and charges it up to the delinquent one.

Every contract goes to the Finance Bureau. Not a penny is paid out until actual delivery is certified. A cheque is then sent by the Treasury, and the transaction, so far as the Surveyor-General of Supply is concerned, is ended.

You will readily understand that thousands of contracts are made every week. How then can the Surveyor-General keep tab on all of them ? It is only through an organized checking system that he can find out how much money he is spending for the Government. Come with me once more into Mr. Weir's office and I will show you how this is done.

Every morning he finds on his desk a "Daily Return of Contracts, Requisitions and Orders to Agents," as

it is technically known. It is a huge sheet recording every contract made the day before. It shows the quantity, value and price, together with a statement of the last contract made for the same article, the price, date and amount then ordered. The only contracts now shown on this Daily Return are so-called Exceptional Demands, like orders for two or three million blankets.

Every Monday morning Mr. Weir gets a weekly contract statement headed: "Approximate Values of Contracts during Week ——." It shows by days the total amounts contracted for in every one of the major departments of supply during the preceding week. It is divided into two sections: one for contracts for definite quantities; the other for "Continuation Contracts," which are contracts producing fixed quantities weekly or monthly. On this weekly contract return is also a statement of Sales by the Department. The War Office, as you will see in a later chapter, sells as well as buys. The main purpose of this sheet, however, is to enable the Surveyor-General to know every Monday morning every pound that has been spent for supplies the week previous.

Some sections of the Contracts domain are so huge that they become separate and self-sufficient principalities. The Royal Army Clothing Department furnishes the most effective example. Here you have a monster enterprise that spends \$250,000,000 a year.

The Director-General is Lord Rothermere, a civilian, brother of Lord Northcliffe, and cast in the same virile and upstanding mould. He controls half a dozen industrial establishments, runs a string of successful periodicals on the side and represents the highest type of commercial magnate recruited for the Business of War. He is virtually head of the war-created Ready-Made Clothing Trust in England, because all needles in the kingdom fly at his will. The wearing apparel needs of the British soldiers come ahead of those of the civilian. After food, the

next most important supply item is clothes. The machine for the garment and accessory provision is characteristic of the thoroughness and efficiency that mark the whole British supply organization. It is charted and diagrammed so comprehensively that you can easily follow every stage.

The Royal Army Clothing Department is primarily a vast department store that provides its own stocks. The control of wool—which I have described—solved the principal problem of production. The contracts are let to regular manufacturers. Each one has a definite article to produce. It may be jacket, trousers, puttee, sock, shoe or cap. There is more to the job, however, than merely placing orders and watching the goods come in. It means constant touch with all trade complications, knowledge of raw materials, meeting labour conditions and forecasting future requirements.

Inspection plays a large part in the army clothing scheme. Every garment must be made up to specifications or it goes back to the maker. Some idea of the scope and effectiveness of inspection is obtained when you learn that out of 3,000,000 pieces of clothing inspected last July 117,000 were rejected. Out of 2,000,000 pairs of shoes sent in 68,000 pairs were turned down. In one lot of 184,000 sheepskin coats—worn by motor-truck drivers—27,000 were found to be below standard.

The British Army clothing contract is a model of its kind. The Continuation System is used. This means that contracts are placed so as to produce a given quantity every week. Combined with this system is a "Break" clause which stipulates a four weeks' notice on either side before the contract is broken. In this way the Public Purse is safeguarded because in the event that the war ends suddenly all contracts can be closed down in one month instead of three, six or nine months, which would be the case if there were no such agreement. The whole Continua-

tion System (which we may well emulate) standardizes production and provides for an even and constant distribution of work and output.

The British have found that the key to successful army clothing supply is to place orders so that Arrears are eliminated. Arrears are goods overdue for delivery. To render them impossible, a census of machinery is taken periodically with the idea of placing contracts so that no contractor will try to manipulate more than the capacity of his plant. He is thus prevented from taking on more than he can produce and then farming out the surplus to the sweat shop.

As with food, the clothing supply must be made continuous and unfailing. The clothing and accessory demands are transmitted from the front to the Divisional Ordnance Stores officer, who issues the requirements from a Field Base. A check is kept on every article that goes out so that it can be instantly replaced. If 10,000 overcoats are issued at X Base in France a duplicate number are sent over from England the very next day, and 10,000 more are ordered from the factory.

Glance at the statistics of the Royal Army Clothing Department and you get a staggering array of figures. Since the outbreak of the war 24,500,000 pairs of shoes and 17,700,000 khaki jackets have been issued. The total issues for the last fiscal year include 12,160,000 flannel shirts, 26,000,000 socks, 6,000,000 jackets, 6,000,000 pairs of trousers, 2,200,000 overcoats, 3,370,000 caps and hats and 3,500,000 cardigans.

To manufacture and equip this immense array of stuff were required 52,000,000 yards of flannel, 437,000,000 buttons, 5,500,000 yards of overcoat cloth, 11,125,000 yards of drab serge and 154,000 gross of hooks and eyes.

Yet this is only one detail of Departmental Supply. Other items issued during a year by the Royal Army Clothing Department maintain the standard of these titanic numerals. They comprised 9,148,000 puttees, 8,000,000 Turkish towels, 3,700,000 tooth brushes,

2,300,000 shaving brushes, 3,500,000 razors, 4,687,000 pairs of suspenders, 3,700,000 table knives, 3,500,000 forks, 3,738,000 spoons and 2,635,000 housewives, for Tommy must do his own sewing in the trenches. From these facts you can see the enormity of the job of equipping the American Army on anything like the scale that the European War demands.

So much for the Contracts Branch. It has done its work. Throughout the world the machines in thousands of factories are humming to provide the supplies that will feed and clothe the British Armies. On millions of acres from Canada to Australia crops are being grown and harvested, forests felled and flocks shorn to the same consuming end. The Producer has qualified ; it is now up to the Distributor to take up the task. Thus it comes about that we hitch our wagon to the star of the Quartermaster-General and his cohorts and see how the supplies are mobilized and sent on their way to sustain and to clothe.

At once you find yourself in contact with a close-knit and perfectly geared system. But this time you are nearer to actual war. You meet with losses ; you touch disaster ; you comprehend for the first time the wrack and agony of suspense. You find that even with the transport of the unromantic biscuit there are thrills and dangers.

It is one thing to order supplies from the safety and comfort of an office in London or through an agent in Montreal, Chicago or Sydney ; it is quite another to get that material across the perilous seas to its destination.

The Quartermaster-General picks up the task of Supply from the moment that the contract is made and nurses the commodity along every stage of its journey toward consumption. This means, of course, that there must be, first, the closest possible co-operation between the two departments ; second, the most intimate co-ordination between the overseas forces and the mobilizing and distributing agencies. The whole

genius of organization is dedicated to one dynamic purpose: not to be caught unawares. Eternal vigilance and team work are the watchwords of these sleepless stewards of the soldier stomach.

Two distinct labours confront the Quartermaster-General. One is to get the supplies mobilized in England (the only cargoes that go straight to France are bulk stuff, like oats and flour); the other is to tranship these supplies to France and the other theatres of war in sufficient and continuous quantities to maintain the armies.

You have already seen how the army needs are made known through the Monthly or Trimonthly Demands. But these Demands are subject to daily, even hourly, amendment. Emergencies arise out of the swift and tragic march of war events that must be quickly dealt with. Here are some instances:

One day the Quartermaster-General got a telephone request from France for one hundred fathoms of wire rope with a tensile strength of twenty-five tons. Such a rope was unheard of. It later developed that it was needed to haul a tank out of a shell hole. The only shop in London carrying this cable was discovered, and it was on the way to France the next day.

There is a constant string of requests for articles that must be created on the spur of the demand. At the height of the first battle of the Somme the terrific mud made it necessary to bring up shells on mule and horseback. Trucks were useless in the sea of slush. "Send carriers for shells," was the frantic appeal from the front. The Director of Ordnance and Equipment Stores devised a scheme of wooden holders connected by chains which could be slung over the pack animal's back. In forty-eight hours thousands of the carriers were not only under construction but some were already at the field of battle.

During that first terrible winter of war, when the British regular soldier lived a lifetime of horror in the frozen trenches, the problem of a portable food

container that would keep food hot had to be solved. It was impossible to make thermos bottles in sufficient quantities, so tin tubs were requisitioned. A layer of horsehair—a non-conductor—was put between the lining, and it met the requirements.

About this time came the first attacks of “trench” or frozen feet. Not “cold feet” in the American slang vernacular, however. A remedy had to be found. The Department chemists got the request late in the afternoon, worked all night compounding a chemical solution and 20,000 gallons were headed for the front the following day.

But irrespective of these unexpected variations from the even and nicely calculated course of army supply there is always the supreme responsibility of keeping the structure intact. The corner-stone of this structure is the Reserve, which is a definite quantity of food calculated to feed a certain number of troops for a certain time. It must be maintained at all hazards. It thus becomes the Insurance against breakdown in transport; enemy action—all those menaces that beset the lines of food communication.

All British supply depots are required to keep a fixed Reserve. This is why the huge assemblages of food in England are called Supply Reserve Depots. The Reserve is always designated in terms of days. Let us assume for the purpose of illustration that the fixed or authorized reserve is thirty days. This means that in every depot or base enough essential supplies must be kept to feed its dependent army for thirty days. The job, therefore, is to keep tab on this reserve. Making thirty days the authorized reserve gives the Quartermaster-General sufficient leeway to replenish stocks even in far-away places like Salonika. Here you have the secret of maintaining an uninterrupted supply of food for millions of troops scattered in the four quarters of the globe.

In order to know just where he stands the Quartermaster-General must reconcile daily needs (which is

consumption), actual reserve available at home and abroad and supplies contracted for. This requires constant juggling, but it has all been reduced to such a precise science that there has never been a break in the chain.

Here is where the co-ordination between the Production and Distribution branches of the Business of War proves its value. One of the links is the Weekly Progress Report. It is a form—filled in with a typewriter—which contains a list of all the food and supplies contracted for. It is really a book, for it includes an index of items and the page on which they appear. This report, which is furnished by the Surveyor-General of Supply to the Quartermaster-General, literally shows “the progress made each week towards the completion of contracts entered into for supplies for the Expeditionary Forces.” I quote the exact title. It is a remarkably efficient exhibit—another evidence of the ingenuity of the supply scheme.

On this report you see a description of the article ordered, the number of the Demand on which it originally appears, the name of the contractor, the quantity to be produced, the amount already delivered, the balance due. If this balance is to be delivered in weekly or monthly instalments the precise facts are stated. By looking at the Progress Report the Quartermaster-General’s aide who has to do with biscuits, for instance, can tell what the whole biscuit situation is. If it is set forth that 10,000,000 pounds are to be delivered to the supply depots in England on the first of every month he can plan the distribution of it to the last tin. So with every item on the list. Since the Progress Report meets the requirements as set forth in the Monthly Demand there is seldom any surplus. Waste is minimized.

The Progress Report is just one cog in the system of Army Supply Intelligence which enables the Quartermaster-General to sit at his desk in London

with his finger on the control of the whole machine. I will now show how it works in connection with the Expeditionary Force in France, which involves millions of men, hundreds of thousands of animals and makes, so far as bulk is concerned, the heaviest subsistence demands. Yet it is supplied as easily as if it were one-fiftieth the size.

Every day the Quartermaster-General receives by wire from the General Headquarters in France the Daily State of Supplies Report. It shows the number of days' reserves of all essential supplies—food, forage and fuel—on hand at noon the day before at all the Base and Advanced Supply Depots in France. It also shows the authorized reserve; and the number of troops and animals fed. If the authorized reserve, let us say, is thirty days and X Depot reports ten days' supply of bacon the Quartermaster-General wonders why that reserve is not kept up. He has it increased at once. He gets a similar telegram from every other theatre of war. From these reports is made the General Supply State, which is the document to which I referred at the beginning of this article, and which summarizes the British supply state everywhere.

Another document which shows the centralization of supply information is the Report of Feeding Strength which is sent in every day from all the armies. This is necessary because of the variety of the demand made upon the feeding facilities. On this sheet you can see the numerical strength of every army unit above Railhead (which means the men at the front); the forces on the lines of communication which comprise the Army Service Corps, the reserves, and the troops resting after having been in action; hospital patients, medical staff, nurses, Allies, civilians and prisoners of war. All must be fed. In short, the total gross feeding strength is revealed here. One distinctive feature of this report is that while it shows every mouth that must be fed in France, it also shows the quantity of food "packed" for these mouths;

port and returned to the shipper as a receipt ; the other remains at the receiving port and becomes the first link in a new chain of accounting that follows the supplies to its final destination.

In order to obtain the closest possible co-operation the Commanding Officer—designated an Assistant Director of Supplies—sends a Circular Memorandum (mimeographed) around to all his section heads every day setting forth the day's requirements in every department with special reference to transport. Thus the biscuit man knows what the tinned-meat man is doing and so on. It enables everybody to work together. Likewise there is a Daily Progress report showing what has been done the day before.

Each day a report on receipts, packing and shipments is sent to the Quartermaster-General ; every two weeks a complete "State of Supplies Dispatched Overseas" is made up showing shipments to every port indicating the quantities sent.

Every device known to modern labour saving is in operation here. Even the marking on the packing cases is in keeping with the system that rules. The cases for France are marked with a green shamrock ; those for Salonika are labelled with yellow ink ; for Egypt with blue. It is a great aid when a ship must be loaded in a hurry, as is always the case.

One detail at this particular Depot will show the completeness with which England watches the rations of her troops. In a small building that crouches between two towering warehouses is a completely equipped laboratory in charge of temporary officers who are experienced chemists. Every sample of food submitted to the Contracts Branch is tested here, and what is more to the point all the supplies that come to the Depot are tested to see if they are up to the standard. The specimens of oil, pepper, biscuit, jam, bacon, baking powder, dried fruit, tinned meat and other articles are taken at random from the

incoming bulk. Woe betide the contractor whose goods are found deficient !

At this Depot 150,000 so-called Iron Rations are packed every day by women. These are the rations (biscuit, beef, tea and sugar all packed in tins) that the British soldier is required to carry in his haversack to be eaten in case the food supply in the field breaks down. Every precaution is taken to keep Tommy from missing a single meal.

It is worth adding that practically the only regular officer at the Depot I have described is the Commanding Officer. All the rest are temporary officers—civilians who have come from every walk of life to do their "bit." You will find engineers, accountants, painters, sculptors, merchants, barristers, architects, lecturers, secretaries of smart clubs, manufacturers, professional cricketers too old for fighting, even a reformed vaudeville artist. It is true throughout the whole supply and Transport Service.

The well-oiled machine which feeds and supplies the British Armies and which has just been taken apart for your edification would operate serenely, almost automatically, were it not for the hazard of shipping. The moment you reach the sea, ancient "nurse of England," you get at the really acute problem of supply, because the most perfect process of provision is powerless against the submarine. The dangers and difficulties of water transport surround the Business of War with constant anxiety.

Yet the British system has stood against torpedo inroads that would have paralysed an organization less resilient. Supply transport offers a shining mark for the U-boat, because not less than 150 ships fly its flag. They are regulated by a Shipping Board which meets every Thursday at the War Office. At this weekly session tonnage requirements are discussed and allotted. On account of the continual movement of troops their requirements vary. Deference is always made to food and munitions. They have the

right of way. For the remaining commodities it is a case of "give and take."

The first question to be settled is that of available ports. A harbour may be open for supply ships to-day and closed to-morrow by reason of mines, enemy action or some other cause. This applies both to France and England. The ships therefore must be fitted to the ports. Once in a port they must be unloaded as quickly as possible. Shipping cannot wait. Tonnage these days is as the breath of life.

Because of the incessant sinkings new ships must be constantly "found." It is only by the most constant touch with all shipping movements that the pawns can be successfully shifted on this animated and momentous chess-board.

The Quartermaster-General has created an elaborate system of contact with all supply vessels no matter where they are. Before him every day is a Shipping Sheet containing the names of all these ships, just where they are and what they are carrying. If a vessel loaded with tinned meat and bound from America to England is sunk the last cargo is immediately reordered by cable. If a ship laden with supplies for the overseas forces goes down another is sent out at once with a duplicate cargo. No loss is permitted to remain a loss.

The check on forage vessels is an illuminating instance of the incessant watch on transport. Take oats. Before the Forage Committee (which buys all the grain and fodder and which is a part of the Quartermaster-General's Service) is a sheet headed "Oats Situation." At the top is printed the monthly requirements for France, which happens to be 95,000 tons. Below is a schedule of the actual supply at all the depots in France in terms of days. In another column is a statement of all oats ships "advised," together with their last Admiralty-reported positions at sea and the tonnage of their cargoes. A Daily

State of all forage shipments is made from these sheets.

The tragedies of the torpedo try the soul of the forces behind army supply. Out of the daily dramas of trial and tribulation come little epics of action; miracles of initiative and resource. There is no time for parley or conference. Contingencies must be met as they happen. Let me lay bare some of these episodes of efficiency that enliven the life of the Department :

One night in the early months of the war the telephone rang in the office of G.M.G. 6 at the War Office. The Colonel in charge took up the receiver. France was calling. The Commandant of a large base supply depot said anxiously :

"The German advance has made our three supply bases untenable. We must have a new port base by to-morrow and enough supplies to feed the Expeditionary Force." The force then numbered nearly a quarter of a million men.

"All right," replied the Colonel, "it shall be done."

He called up the Army Shipping Bureau, where there is always some one on watch.

"Have you ten available ships?" he asked.

"Yes," was the reply.

"Then have them all at — at six o'clock in the morning," was his command.

He then rang up three Supply Reserve Depots and ordered the shipment of supplies on to this port, special trains. At noon the next day the loaded vessels were on their way to France. It is interesting to add that the port used in this emergency is the one where the first American Expeditionary Force landed, and which is now used by our Government.

Sinkings always call for swift and decisive action. A ship loaded with flour for the forces in Mesopotamia was sunk in the Mediterranean. Three additional ships with duplicates of this cargo were all torpedoed in rapid succession. Meanwhile the supply of flour

for General Sir Stanley Maude's army was getting dangerously low. By an energetic use of the cable enough was borrowed from Egypt to tide it over until the arrival of the fifth ship, which broke the hoo-doo.

Here is still another kind of emergency. Last winter a big blizzard in the Eastern American States congested railway traffic and prevented the wheat trains from getting into Hoboken, New Jersey, where the British grain ships load. Wheat suddenly became very scarce in England. The Forage Board, which knew of all available sources, bought up the supply, and there was no discomfort. The men of the "Q.M.G." always find a way.

Again, one of the most important ports in France was blocked by the sinking of a ship at the mouth of the harbour. At this port was a base supply depot that fed one-fourth of the British Army in France. To open a new port was impossible. Overnight the Quartermaster-General's Department shifted the whole shipping scheme. A dozen vessels were diverted to other ports and the supplies rushed North on special trains. There was not an hour's delay in the procession of food to the front.

So it goes. Each day brings its exactions and its exigencies and likewise its compensation in the shape of victory over threatened disaster. The prosaic task of maintaining army supply becomes invested with a glamour of adventure no less stirring and romantic than the feats of the firing line it feeds.

In the last analysis, War is Worry and Work.

III

FEEDING THE FIGHTING MILLIONS

THE troops had gone "over the top" that morning. Shells still rent the air and there was tension all up and down the line. Nearly all the casualties had been "cleared," but the list was growing every hour. Across "No Man's Land" flared the ominous white signals that indicated impending enemy movements; there might be reprisals any moment. It was still a ticklish corner for a civilian to find himself in.

Suddenly the appetizing odour of hot stew smote the nostrils, overcoming the acrid smell of smoke that hung like a pall over the leprous landscape. It was like a message from home.

"Here comes the 'chow,'" spoke up a husky young Canadian.

Hardly were the words out of his mouth before the food squad was in our midst with steaming "dixies" and the thrill of war was forgotten in the unromantic consumption of beef and potatoes, washed down with tea. All the time the German guns boomed an incessant "strafe."

Late that afternoon I made my way back to headquarters under the mantle of a friendly haze. Just behind the first-line trenches I saw a sinister, crimson splash on the ground.

"What's that?" I asked the Captain who was showing me around.

"One of the food squad was 'done in' here," was his laconic reply.

A few hundred yards away we struck the light railway that is used generally in the war zone to transport supplies. A well-aimed shell had blown up fifteen or twenty yards of track only an hour before, yet a detail of engineers was already out at work repairing it.

In this little picture you visualize the hazard and hardship that attend the bringing up of Tommy's food in France. What happened in the bloody angle of the battle-line that I have just described is happening every day and every night wherever the British soldier sets up his fighting abode. Regardless of the deadly storm that beats about him, he never misses a meal. His rations—even the tin dishes that contain them—are cogs in a ceaseless and unfailing system of provision that is no less effective under fire than back at the original source of supply. From the moment that the food and equipment reach the port of arrival in France until it is distributed to the soldier in the field it is under incessant supervision and accounting.

In a previous chapter I explained the organization which enables the Quartermaster-General to all the British Forces to sit at a desk in London with his finger on the pulse of the whole Supply and Transport situation. I then dealt with the Province of Production, whose titanic demands draw upon the whole world of output. Its seat of Government is the War Office in London.

We now enter the Domain of Distribution, whose capital is that best known and least known of all Allied war establishments, the General Headquarters of the British Armies in France, or "G.H.O." as it is more commonly known. From this picturesque, time-worn building with its cobble-stone court, which has jingled with the spurs of many generations of French soldiers in the making, radiates the conduct and control of a marvellous machine—a Subsidiary

Corporation in the Business of War, but just as many-sided and efficient as the Parent Corporation which stocks its shelves.

When you cross the frontiers of the Domain of Distribution you become a spectator of the vast Drama of Life and Death, whose stage is a far-flung fighting front, and whose curtain is a Curtain of Fire. You hear the shriek of shells ; you touch the tragedy and terror of actual combat ; you see the wounds of war gaping before you. Here the ration is as vital as the shell. Subsistence means Existence itself !

To grasp clearly the whole scheme of British Army Supply in France you must first get the details of the organization in your mind. To begin with, there is at General Headquarters an exact replica of the Quartermaster-General's organization at the War Office. Every head of Department in London has what is called an "opposite number" in France. It is headed by Quartermaster-General, Lieutenant-General Sir Ronald Maxwell, who bears the same relation to the supply force in the field that Lieutenant-General Sir John Cowans bears to all the forces everywhere. He is the ranking subsistence officer in France.

With the rest of the organization, however, there is a slight variation. In the War Office Major-General A. R. Crofton Atkins is Director of Supply and Transport, combining the executive responsibility for both branches of the service. In France the task is so colossal in actual interpretation that there is a separate Director of Supply and a separate Director of Transport. For the purpose of this article we are concerned solely with the problem of Supply. Transport will be dealt with later on.

This means that the dominant personality of this narrative is Brigadier-General E. E. Carter, C.B., Director of Supply. His desk is the nerve centre of the organization that feeds the front and the rear. He is big, broad, upstanding and wears a uniform as if he were born in it. In the South African War he was

Director of Transport, yet he turned as swiftly and as competently to the task of Supply as if he had been trained for it all his life. It is a tribute to the versatility of the British regular. Ask him what rules lie behind the whole system that he galvanizes and he will say :

"Supplies are valueless unless they are transportable by every conceivable means and reach their destination without delay."

In this sentence you get the keynote of the whole Supply organization in France. "Deliver the Goods" is the slogan that drives men and motors day and night.

Let us now examine the task that is put up to General Carter. Every day and every night supply ships are arriving at various ports in France, laden with food and equipment for the millions of fighting men and forage and fuel for their horses and mechanical transport. This immense flood of supplies must be unloaded, some of it stored away in warehouses to keep up the fixed reserve as insurance against breakdown in transport ; the rest of it goes up the line to maintain the war machine. Every pound and parcel must be registered and accounted for throughout its journey from arrival to consumption. This means keeping track of millions of tons of an immense variety of articles.

With Distribution, as with Production, you find the triumph of scientific business methods. In General Carter's office, for example, is a huge chart, which tells the whole story of the extraordinary team work that stretches from port to trench. Nothing is left to chance. You will discover among other things a scheme of auditing that would do credit to a department store. You will see a rentless "follow-up" system that pursues the wayward freight car, runs down the missing motor-truck, lets no guilty package escape and stands as a sleepless guardian of goods. Books are kept and accounts standardized. Centralization is the watchword. The Director of Supply can



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BRIGADIER-GENERAL E. E. CARTER, C.B.
DIRECTOR OF SUPPLY OF THE BRITISH ARMIES IN FRANCE

sit at his office at "G.H.Q." and know at any hour of day or night what ships and their cargoes are headed for his ports ; the exact amount of supplies in pounds, gallons and cases that are piled up at every one of his many supply depots, and precisely what inroads are to be made upon them during the next twenty-four hours. In other words, the well-nigh infallible machinery of Army Supply Intelligence is at work all the time.

Now all these remarkable results are only obtainable through one agency—Co-operation. I have rarely seen anywhere such team work as obtains in the dramatization of the Army Supply idea in France. It is just as if a monster jobbing business had been reared by the British Government and dedicated to meeting the requirements in the field. Wherever you turn you find the parallel with trade.

Here as elsewhere in the Commissariat the helpful pyramid points the way. At the apex of it is the Director of Supply, who occupies the position of Vice-President and General Manager, the Quartermaster in the Field being the President. Ranking next to the Director are three Deputy Directors of Supply. One has charge of the Inspection of all supplies ; a second is the Chief Office Assistant, who corresponds to an Office Manager in an American business ; the third is the head of the so-called Investigation Department, which audits accounts and deals with Finance and Economy.

The Deputy Director of Supplies in charge of the office has three assistants who rank as Assistant Directors of Supply. The first of these deputies deals with the all-important matter of Demands. It is to him that the needs of the armies in the field are made known, and he in turn transmits the Demand covering these needs to the Quartermaster-General in London, who provides the supplies through the Surveyor General of Supply.

The second Assistant Director of Supplies is charged with the supervision of Shipping and Transportation,

while the third has to do with Personnel. This group of officers comprises the Supply Directorate. It corresponds precisely with the Board of Directors of a Corporation, each Director being the head of a department. This Board meets every day. Every man, therefore, knows what his colleagues are doing, and is in touch with the whole field supply situation.

This Supreme Court of Supply is merely the Headquarters Organization. For all practical purposes it is duplicated in the field. One section is at the front, where each one of the five armies has its own Deputy Director of Supply and Transport. On the so-called Lines of Communication—the water, rail or public roads along which the Army and the supplies travel—there is still another Supply Machine, including a Deputy Director of Supply for the Northern Line, and a corresponding executive for the Southern Line.

This brings us to the whole lay-out of Supply, which is set forth on what may well be called The Map of Distribution in France. There are many remarkable charts and diagrams in the scheme of Army Provision, but none exceeds this one in efficiency and detail. A child could understand it. It incarnates scientific business organization.

Spread it out before you, and you can see in red, blue and green lines and a succession of coloured circles, triangles and squares the whole scheme of supplying and equipping the armies, from the wharf in the French port straight through all the processes and repacking and transhipping up to the first line trenches. Every line on the map has a caption that explains precisely the activity that happens on it. It may be the shipping of bulk forage and grocery trains from a base port to an Advanced Depot. It may be an indication of the route of meat supplies, packed in detail at the wharf and bound for a freight station. It may reveal the movement of coal from the mines to the Railhead, or it may emphasize in a red circle that X Base is used solely for canned goods. I give

these facts merely to show that the system was on paper before it was translated into practice.

Now let us see how it works in actual operation. For the purpose of Army Supply the whole of Northern France has been divided into two districts. One is the Northern Line of Communication, and includes two major ports of entry and a minor one. These ports feed and supply three of the armies. On the Southern Line are three major ports which feed, fuel and supply the two remaining British Armies. All the ports are called Base Supply Depots. By reason of the proximity of the Northern Ports to the fronts of the armies, there is a slight difference between the organization of the Northern and Southern Lines.

This difference lies in the fact that on the Northern Lines the food practically goes straight from the Base Depot to the Railhead—that is, to the terminus of the railway line, while on the Southern Line it goes in bulk to what is called an Advanced Base Supply Depot, where it is repacked into Divisional Trains, each one supplying the needs of two Divisions and sent on to Railhead. At the Railhead the system of distribution is the same for both lines. Here the supplies are unloaded on motor-trucks, and sent to what is called a Refilling Point, where they are in turn transferred to horse-drawn wagons and taken up to the trenches. This, in brief, represents the main itinerary of the food from the time of its arrival until it reaches the Quartermaster of the fighting unit, usually a Brigade Officer, who distributes it among the Regiments (or Battalions as they are known in the British Army). The miracle of all this shipping and reshipping, packing and repacking is that there is a definite record and check on every tin of beef until it reaches the kettle or the pot.

There is still another slight difference between the Northern and Southern Lines. At the former all kinds of food and commodities are received at the same ports, while at the latter each port specializes.

This means that in the North a Base Supply Depot houses petrol, groceries, meat and forage, while in the South one port deals exclusively with forage, another with petrol and cased goods, and the third with bread and Ordnance Stores. Here, then, you have a general bird's-eye view of the Domain Distribution.

The whole operation is of peculiar interest and value to the United States, because our overseas troops face precisely the same conditions, both as to ports and lines of communication. In fact, the American Expeditionary Force is using an abandoned Base Supply Depot established by the British in the early days of the war.

But we cannot go into the feeding and supplying of the armies without first finding out what the tools of the trade are. With fighting these tools are men and guns; with Supply and Transport they are, in the main, men, motors and wagons. The men who comprise the Army behind the Army are the Army Service Corps—the unsung heroes of the hard-fought battles with wind, mud, rain, shells and every other menace that besets the transport of supplies under actual war conditions.

The story of the Army Service Corps is in itself a romance not without thrills and heroism. It began with Wellington's Royal Wagon Teams; later became the Commissariat and Transport in the Egyptian Campaign and had its baptism of blood in its present form in the Boer War. For years it was a sort of Cinderella of the Army, rejected and despised by the men of the line. There is caste in War just as there is in Society. Yet the aristocrats of the forces would be impotent without the "Underground Cavalry," as the Army Service Corps is sometimes called.

At the beginning of the war it numbered less than 10,000 men and a few hundred officers. To-day it is more than thirty times that number—a host greater than the Iron Duke ever commanded—one that vies

in strength with Napoleon's mightiest array. You comprehend the scope of Supply and Transport and the millions that they serve when it takes such an army to fetch and carry alone.

There is no space here to tell how the Army Service Corps is recruited and drilled; how the men are assembled and weeded out according to their previous civil experience in the huge training camps in England; how a farm hand becomes the driver of a horse-wagon; and the one-time chauffeur of a peer's limousine in London becomes the driver of a five-ton motor-truck in France; how grocers' clerks develop into Supply Depot stackers; how brokers, bankers, expert accountants and business men in general are trained to be the officers of these battalions. These men from the ranks of trade become the "Temporary Officers," to whom Britain owes so much.

There are Schools of Instruction in France at the Base Supply Depots where both officers and men get a final course of intensive training. The men are put through their paces in the handling of horses, harness and wagons and the upkeep of mechanical transport. The officers are sent to school, where there are daily lectures, and where they are taught how to take their places as cogs in the whole system of Provision^{ing} and Accounting. There is a series of text-books for these schools just like the text-books used in a university. The officers are required to pass an examination, and if they fail they are sent back home.

One of these text-books—and it will give you some idea of the thoroughness of the course—is called "The Ready Reckoner." In this book a Supply Officer is shown how to divide up rations. He is shown, for example, that if 160 complete daily rations are issued to him he can find out the bacon allowance by dividing this by four, which gives him 40 lb., or the exact amount of bacon required. He is further shown that, if he divides the bacon result by two, he can get the butter, cheese and oatmeal allowance, which

is 20 lb. each. The whole system enables the conduct of the commissariat to become mistake-proof.

No Class A men are now used in the Army Service Corps. Class A men are fit for fighting. In the early days of the war there were many of them on the Lines of Communication, but as the armies expanded and the losses grew they were all weeded out. Thus in the "A.S.C." you find thousands of middle-aged patriots who are doing the work of younger men.

Nor is all this patriotism confined to the middle-aged. I was talking one day to the Commanding Officer of the largest Base Supply Depots in France when an erect, white-haired man wearing the single star of a subaltern came up, saluted and gave a message in precise military fashion. When he was through he clicked his heels together, saluted again, and, with a "Thank you, sir," made off.

"Do you know who that officer is?" the Colonel asked of me.

"No," I replied.

"He is my father."

In this case the father was seventy-one years old, and a country squire, but, like many of his countrymen, he felt that he had to be doing something. It is this sort of spirit that will win the war.

One more highly important detail must be mastered before we can proceed with the operation of the Supply and Transport in the field. This detail deals with the most important freight that Transport is called upon to convey. I mean, of course, food and its accessories. Here we reach the one war subject of universal interest. Everybody eats; therefore, everybody is interested in the kind and quantity of food that the soldier gets. We will halt our line of march, therefore, and take a look at Tommy's larder.

What most people do not realize is that Thomas Atkins is probably the best-nourished soldier in the world. He is fed like the proverbial fighting-cock. Moltke once said that "no army food is too expensive."

This conjunction, laid down by a master of warcraft, is followed to the letter. There is no scandal of embalmed beef about the British Commissariat. The soldiers get the best that the market affords, and lots of it. Officers and men have precisely the same ration. I have eaten at many a Tommy's mess at the front and behind the lines, and I have always found the food abundant and excellent. Indeed, after courting eternal indigestion with French war bread (it is one of the real horrors of war) it is always a luxury to get the field-baked white bread which is part of the British army ration.

The soldier's daily ration has been scientifically worked out by the best food experts of England. In the Boer War it was one and one-fourth pounds of biscuit, one pound of fresh meat or one pound of tinned meat, four ounces of jam, three ounces of sugar, two ounces of desiccated vegetables, one-half ounce of tea, half an ounce of coffee and pepper and salt. This, however, was hermit's fare compared with the almost infinite variety of food available for the fighting men to-day, because, as you may recall, there are exactly four hundred and fifty items on the Quartermaster-General's list of Supplies.

At the beginning of the present war the Boer War ration was immediately reinforced by four ounces of bacon, three ounces of cheese, extra tea and one-eighth of a tin of condensed milk. This ration was the same for the men training at home and in France. Later a ration allowance of eight cents a day for each man was made to take the place of part of the home ration, and to be spent under the direction of the Officers of Unit.

Early in 1917 a very radical amendment was made in the ration scale in France. Two rations were established: one for the troops at the fighting front, who had to depend upon what is issued to them and who undergo severe physical hardships, and another, and slightly smaller, ration for the troops on the Lines of Communication. The food for the fighting men

is practically the same as for the men in the rear. The only difference is that they get more of it. The fighting or "Field Ration" costs forty-five cents per day per man, while the so-called "L.O.C. Ration" costs thirty-nine cents.

Meat, of course, constitutes an important item in the stoking of the soldier's stomach. The British Tommy is a carnivorous animal, and must have his beef. The normal daily ration for the fighting man is one pound of fresh or frozen meat. Three days out of every seven he also gets a small portion of the so-called "M. and V." ration, which is meat and vegetables, cooked and canned. Four days out of seven, instead of the "M. and V." ration he gets a similar portion of canned pork and beans. There is also an allowance of four ounces of bacon, which is served at breakfast.

Bread is a very important item. The regular daily allowance is one pound of fresh bread or ten ounces of biscuit. Usually the bread ration is so arranged as to include 75 per cent of bread and 25 per cent of biscuit.

Other items in the normal daily allowance for the troops at the front are ten ounces of rice, two ounces of butter, which is served three times a week, three ounces of jam, five-eighths of an ounce of tea (or coffee when desired), two ounces of cheese, two ounces of oatmeal three times a week, three ounces of sugar, one ounce of condensed milk, an ounce of pickles three times a week, two ounces of potatoes, eight ounces of fresh vegetables when obtainable, or two ounces of dried vegetables as a substitute, salt, pepper and mustard. As a luxury each man gets two ounces of smoking tobacco or cigarettes once a week, and a box of matches three times during the fortnight.

Rum is served at the discretion of the General Officer commanding. Its issue depends upon just what the troops are doing. In very cold weather a nip is given out every day, whether the men are in the first-line trenches or behind. Rum is always issued, how-

ever, in that ghastly moment just before daybreak, when the troops "stand to" with ears, eyes and heart alert, waiting for the enemy attack that sometimes comes and sometimes does not. No ordeal, not even going "over the top," is such a strain on nerves as this moment of tense expectancy. The most copper-riveted of Prohibitionists would not begrudge Tommy his wee drop of consolation at this hour of dread and dawn.

The "L. of C." ration, which is also served to the "G.H.Q." troops, is precisely the same as this except that, instead of a pound of fresh or frozen meat each day, only twelve ounces are issued. The issue of the remaining items on the list is on a corresponding scale of reduction.

The ration that I have described is the regular issue. It has become, however, a sort of elastic institution, adapting itself to season and locality. At some of the huge camps the men raise their own vegetables, the garden being tended by the permanent force. At one camp in France I saw a pig-sty and a rabbit-warren which enriches the diet and provides extra luxuries for the men, because some of the meat is sold to the natives.

Then, too, a so-called System of Substitution adds to the variety of Tommy's food. Last summer when bacon was scarce all over England, sausage, fish, rabbits and brawn (or chopped meat) were substituted for the home forces. The War Office now controls a whole chain of sausage factories, and a sausage issue takes the place of fresh meat one or two days a week in the field. This will mean a saving of five million dollars a year to the Government. When I left France the Director of Supply was establishing piggeries to maintain a steady supply of bacon.

Long experience with the feeding of soldiers has taught the food experts that the best way to keep men fit is to vary their diet as much as possible; hence the substitution is carried out to the last degree. Sardines,

or tinned herring in tomatoes, or canned veal loaf often take the place of preserved meat at the midday meal, while Cambridge sausage or roast sausage is used in lieu of bacon at breakfast.

The British Tommy, unlike the French *poilu*, has two big meals a day. He has his bacon or tinned meat of some kind, bread and jam for breakfast, while at lunch he has stew or "bully beef," potatoes, vegetables and always a dessert, more often a pudding of some kind. His evening meal comes under the head of "tea," and includes cold meat, bread and jam. In the trenches supper is always hot. At all three meals he has his option of tea or coffee. These are the standard menus, subject always to amendment by reason of the system of substitution that I have described.

Now if the "Field" and "L. of C." rations were the only food issues the task of provision would be comparatively easy. But the British Armies in France to-day are such a cosmopolitan assemblage that the matter of diet is as complicated as that of a World Food Congress recruited from all the nations of the universe. It results from the fact that when Britain sent out her trumpet-call throughout the Empire, all the peoples of her dominions came flocking to the standard. They represent every race under the British flag, and this means that white, brown, yellow and black men are geared up to the Great Cause. The Brahmin, Mohammedan, Chinaman, Kafir, Egyptian, Fijian, the East Indian, West Indian and South African all meet at John Bull's mess-table. With the exception of the East Indian Cavalry they are enlisted in the Labour Battalions.

You have a conflict of religion, taste, habit and custom, and every one of these eccentricities, born of climate, temperament, and tradition, must be met and appeased. If not, the fighter or labourer is dissatisfied and his efficiency is impaired. Hence a separate and distinct ration is issued to every one of these foreign

groups. At one Base Supply Depot exactly seventeen different diets are supplied.

The Indian personnel, for example, has a ration which consists of *atta*, mealie meal; *dhal*, a split pea; *ghi*, or nut oil, which is a substitute for butter; *gur*, a native sugar; mixed spices, fresh vegetables and fresh meat.

The meat for the East India troops is obtained in very picturesque fashion. The East Indian will only eat goat and sheep meat, and this only when the animal is killed according to native rites. Near one of the British Base Depots in France is a huge goat and sheep farm, which is conducted entirely for the native troops. Every day you can see bearded and turbaned priests slitting the throats of the beasts with much Oriental ceremony. When the natives get their meat they know it is not profane. No British Quartermaster would dare to try to deceive them.

The Fijians have a ration of frozen meat, rice, sugar, fresh vegetables, margarine or some other edible fat, while the Chinese are content with a little meat and a large amount of rice and bread. One of the luxuries of the Chinese diet is nut oil. Lentils, cheese, fresh vegetables and bread form the larger part of the menu of the Egyptian labour corps. So it goes. Every taste must be pandered to. It is the price that must be paid to keep the huge labour machine oiled and going.

Nor must it be forgotten in connection with field rations that there is also a separate diet for the German prisoners of war, who are technically divided into what is known as "P. of W. Companies," and segregated in camps surrounded by barbed-wire fences. The British have found that it is both practical and expedient to let the German prisoners run their own mess. The normal daily ration of a captured Hun is nine ounces of bread, six ounces of fresh or frozen meat five days a week and ten ounces of salt-cured herrings,

sprats or smelts two days a week. He also gets half an ounce of tea or coffee, an ounce of sugar, four ounces of potatoes, two ounces of turnips and peas or beans, three ounces of rice, two of oatmeal and a little jam and cheese. Recently the British have succeeded in making the so-called *Schwarzbrot*, which is the familiar black bread of Germany. This not only makes the Boche happier but saves considerable money to the Government.

Then, too, the British issue food to the French, Belgians, Portuguese and American troops in some instances, and also to the Women's Army Auxiliary Corps, or the "Waacs" as they are called. You can see, therefore, that with all these different types of rations, with the Iron Ration—the tinned emergency food that every soldier carries in his haversack—and the Train Ration which is given to the troops for consumption while travelling on boats or trains, there is an immense amount of detail to the provision of the inner man alone.

Fortunately, animals have no choice of food, and the issue of forage is a simple matter. Heavy draught horses get seventeen pounds of oats and fifteen pounds of hay a day, while officers' mounts and other horses get twelve pounds each of oats and hay. This is also the forage ration for mules of fifteen hands and upwards that are employed on heavy draught work.

IV

FROM SHIP TO TRENCH

YOU have now seen the kind of food that man and beast require. You have also had a swift panoramic glimpse of how it is transported from ship to stomach. We can now go into the work of this system which receives, checks, accounts, stores and sets it down at the very threshold of consumption.

Perhaps the best way to continue the parallel with business would be to regard the huge Base Supply Depot as the Wholesale Branches and the so-called Detail Issue Stores where the units on the Lines of Communication get their rations as the Retail Branches. Keep this distinction in your mind and it will be easier to follow the sequence of food events.

Any port will serve to begin with, because the system is the same for all. Let us first take the largest of all the ports of entry in France. It is on the Southern Line, and, therefore, specializes in supplies. In this particular instance the specialties are forage, frozen meat and flour.

Since this port is on the Southern Line and therefore somewhat different in executive organization from the Northern Line, it may be well to say that the ranking officer is technically known as the Officer Commanding Base Supply Depot. His chief is an Assistant Director of Supplies, whose headquarters are at the main Advanced Base Supply Depot that he

serves, and who in turn reports to the Director of Supplies at General Headquarters.

A Base Supply Depot is simply a collection of huge sheds, or hangars, as the British call them. In this particular case they are all near the docks, where the goods can be readily removed from the ship and immediately stacked. Formerly all the work of Supply and Transport from the time a supply ship reached port was done by the Army Service Corps. In the autumn of 1917 the job of unloading the vessels was taken over by the Director-General of Transportation, who supervises the unloading. The actual piling up of the supplies is done under the direction of the Department of Labour, which controls the many native labour battalions. But the moment the supplies are piled up in the hangar they pass into the hands of the Army Service Corps, and remain in its keeping until it reaches the kitchen, the stable or the garage.

As soon as a supply ship touches at a Base Depot it is caught up in the toils of a perfect system. First of all, one of the duplicate invoices of cargo that accompanies the vessel is checked up and sent back to the port of departure in England or Canada as a receipt that the goods were delivered. The other duplicate invoice now becomes the first link of an endless chain of accounting that lasts until the supplies are consumed or destroyed.

Probe into the whole Base Supply System and you find that the motto unfurled at the flag-pole is "Cut the Carry," which means that economy of time and labour in the handling of the immense stores is the keynote of progress. Everything is bent toward this end. Goods are stacked up so that they can be counted swiftly and easily. For this reason every pile of hay, oats, flour or canned goods has, hanging alongside, what is known as a Tallyboard. This board contains the letter of the shed or hangar (each shed has a letter), the number of the block (every different kind of commodity has a block or a street) and every stack in that

block has a number. Additions or withdrawals from any block or stack of supplies are recorded on it and can be seen at once by the checkers-up. You could make a complete inventory of a Base Supply Depot in an incredibly short time.

One reason is that the stacking of supplies is scientifically done. In harmony with the perfection of detail that marks the whole system, the Director of Supply has prepared a Manual for the Army Service Corps called *The Stacking and Storing of Supplies*, which shows with simple and comprehensive fact and with cross-section illustrations just how stacks of cased goods, sacks, bales of hay can be piled up so as to expedite accounting and unpacking. From this you learn that there are such things as "Pillar Pile" for cases; and "Tower Stacking" which enables the supplies to be carried up to the roof.

One chapter in this book shows how much space is required for storing and stacking rations for given numbers of men and horses. A man, for example, can look at a pile of boxes and see at a glance how many troops it will feed.

Here, as elsewhere throughout the whole Empire of Supply and Transport, absolutely nothing is left to chance. All Supply Officers, for example, no matter where stationed and who have the slightest contact with Supplies, must master a book entitled "Financial, Economic and Accountancy Regulations and Departmental Instructions." Every detail of work is here specifically explained. It thus becomes the Bible of Supply. You get the keynote of the whole Commissariat when you find that one of the first paragraphs in the book is this :

"In time of peace the interests of economy, while entrusted in various degrees to administrative and other officers, are also safeguarded by various checks and limitations, and in particular by the total amounts voted by Parliament under the several

heads of the estimates. During war, however, not only are these limitations to a certain extent removed, but the total expenditure is on a vastly larger scale. The possibilities of economy open to officers are consequently increased, and the elimination of waste in every branch of the Service becomes a matter of primary importance, and should be the object of particular concern to each individual officer."

Now let us see what happens at a Base Supply Depot. The one I shall use for illustration is mainly used in the second largest hangar in the world, which is more than half a mile in length and over six hundred feet wide. It adjoins the biggest dock in France and is like a complete freight city under one roof. I have seen it when it contained 80,000 tons of supplies, of which 30,000 tons were in oats, 20,000 tons in hay, while the rest was flour and cased goods.

The hangar was a babel of foreign tongues. You heard Kafir boys singing as they carried sacks of oats from ship to stack ; a song of the Nile came from the Egyptian coolies, who hummed as they staggered under bales of hay ; you caught the note of a sentimental German lullaby whistled by a prisoner of war, trundling a truck of canned groceries. Here was a whole world of labour, recruited from friend and foe alike, and marshalled to the stupendous task of feeding the British soldier. Amid an almost indescribable din and what seemed to be the wildest confusion there was admirable control.

The Commanding Officer of the Depot, sitting at his desk in a little frame office that is almost lost between his towering ramparts of food and forage, is absolute master of the tumultuous situation. He is on his job at eight o'clock. At eight-thirty he has a conference with representatives of the Admiralty, the Director of Docks, the Director of Labour and the Director-General of Transportation. Thus he knows what

cargoes are to be landed and what human and other machinery are to handle them.

More than this, he also knows every hour precisely how his whole monster business stands, down to the last case of jam. How is this possible when from 20,000 to 30,000 tons of supplies arrive and depart daily and when all these goods are being constantly transferred from one place to another?

The answer is quite easy. Such a complete check is kept on every pound of incoming and outgoing stuff that the "O.C.," as the Officer Commanding is called, is able to send his chief at the Advanced Supply Depot what is called the Daily Stock Wire, which tells the precise amount of supplies on hand and what is due to arrive the next day. This is achieved by balancing Receipts, as the incoming supplies are termed, and Issues, as the outgoing supplies are known. The surplus is technically known as Remains. This is obtained through a simple but effective process. Each group of commodities is in charge of a Section Officer, who renders a Daily State of his department every night. This sets forth specifically the amount of food he has on hand the preceding night, the day's Receipts and Issues, the Transfers or Issues for local troops and the Remains, at the time of making the report. The sum of these Daily States furnishes the information conveyed in the Daily Stock Wire.

The Daily Stock Wire is necessary to the Deputy Director of Supplies at the Advanced Base Supply Depot, who must know just the amount of goods he can draw on. Remember at this point, that the advanced Base Supply Depot is the link between Base Supplies and Depot and the Regulating Station where the Supply Trains for the front are made up. If there is a sudden increase of troops in the field and more supply trains must be made up every day, the Deputy Director of Supplies knows immediately that demands for more food can be filled at once. It is part of the perfect interlocking of supply forces.

The supplies from the Base Supply Depot which I have just described—and it is typical of all in the Southern Line—are shipped in bulk; that is, in solid trains of bread, meat, forage, flour, petrol or groceries. These trains, with the exception of those carrying groceries, go direct to the Regulating Station, where the freight is repacked on to the Divisional Trains. The grocery trains are unpacked at the Advanced Base Supply Depot and the freight sorted out according to Divisional needs.

One reason why there is such a constant procession of bulk trains out of the Base Supply Depots is that there must be a quick turnover at the ports, because vessels are coming in every day and a congestion of shipping would be fatal. One day's hang-up might clog the supply machine all the way up to the first-line trenches. These bulk trains are loaded inside the hangars. The stacks are all piled alongside the tracks so that loading is expedited. "Cut the Carry" is carried out to the last degree.

Every bulk train from any Base Supply Depot on the Southern Line includes bread. This is because no Base is complete without a Field Bakery. Bread, when all is said and done, is the soldier's staff of life. He must get it in continuous and enormous quantities. This means that the dough troughs and the ovens must be constantly in action.

These bakeries are all operated by Army Service Corps men, most of them practical bakers before they went to the war. These establishments are marvels of output. They are all practically alike in operation, although in some the dough is kneaded by hand and in others by machinery. The standard loaf for the troops weighs two pounds, which is two normal daily bread rations. The average output of the largest Field Bakery is 220,000 loaves a day, or 440,000 rations. They work day and night.

These Field Bakeries are models of production. It takes just three hours for the flour to pass from barrel

to baked bread. Once baked, it is stacked in bins for twenty-four hours, then sacked, weighed, loaded into a freight truck and rushed off to the Advanced Base Supply Depot. The railway trucks come right into the bakery sheds. No army bread is served to the troops until it is ninety-six hours old. Part of this time, however, is consumed in transit.

The same scientific scrutiny is placed over the army bread as over every other article that Tommy eats. At these Field Bakeries you will find complete laboratories which bake and wash and test samples of all the flour to ascertain its ingredients. One reason for this close watch is that the soldier's bread—unlike the bread of civil life—must do considerable travelling. If there is an excess of sharp-pointed bran in the flour it will puncture the cells of gluten, on the road, and impair the nutritive quality of the loaf. In other words, the flour must be so mixed as to get a sufficient gluten percentage to withstand the hardship of much rough jolting and rehandling on the railroad. You will also find in these laboratories a dough meter, which analyses samples of all the dough that is mixed. The big fact about the Field Bakery, aside from the enormous output, is that the soldier's bread is safeguarded by every device known to science.

Even these Field Bakeries do not escape the thrill of actual war. In the Dardanelles campaign the bakers were as much exposed to fire as the fighting men. At Hellas a bakery was established on the Peninsula and was maintained within four miles of the Turkish lines during the whole period of occupation. All the Base Supply Depots are not under cover. The principal Base on the Northern Line, where in one day I saw 40,000 tons of oats and 32,000 tons of hay, is an outdoor town and where you can wander through acres of supplies. Here the oats are conveyed by suction from the holds of the ships into sacks, which are stacked up to a height of sometimes a hundred feet. They are protected from the weather by tarpaulins.

In order to prevent spontaneous combustion among the huge mountains of hay the temperature of the stacks is taken regularly, with thermometers fastened to the ends of long poles. These thermometers are stuck into the heart of the pile every two weeks.

At the Base Supply Depots on the Northern Line the Officer Commanding is an Assistant Director of Supply, because these Bases and their Advanced Bases are practically located in the same place. Their Regulating Stations are also close at hand, because the armies they feed are much nearer to their source of supply than those fed by the Southern Lines, where the Base and Advanced Depot are miles apart.

We now turn from the Wholesale Branch of the Business of War as represented by the Base Supply Depot to the Retail End, which is the Detail Issue Store. Here is where the Army becomes a shopkeeper and runs a miniature Department Store.

The Detail Issue Store is the place where the food for troops not at the Army Front is given out. This means that it supplies the whole Army Service Corps, the troops at the Rest Camps, where the drafts from England remain for a brief interval before going to the front, Labour Battalions, Prisoners of War, the Woman's Auxiliary Army Corps and any other persons employed on the Lines of Communication. These Stores are always attached to the Base or the Advanced Supply Depots. They are literally what the word implies—a Store, with counters, shelves for goods, bins for vegetables and a fresh meat department, presided over by men who were butchers in civil life. The establishments have regular hours for doing business, the usual time of issue being during the forenoon, when the men from the unit's quartermaster detail come with their sacks if a small force is to be fed, or motor-trucks if the camp is large, for supplies for the next day.

Let us see how this works. Assume that one hundred men of the Army Service Corps attached to

a Base Depot need food for Wednesday. A Corporal and a detail of privates come the day before in a motor-truck to the Detail Issue Store with what is called an Indent for Rations. This is a printed form (used throughout the British Armies) constituting a formal Demand for supplies. It contains the name of the unit, its location, the number of rations required, the specific list of troops, officers and men to be fed, the kind of animals employed, the fuel and light required and rum and tobacco needed.

The Corporal hands the Indent to the Chief Issuing Clerk, who details one or more men, as the quantity requires, to assemble the supplies. The Indent for Rations is issued in duplicate. One of these is signed by the Issuing Clerk, and is returned to the unit as a voucher. The other, signed by the receiving soldier, becomes the Store's memorandum of issue.

Where the unit to be supplied is very large the Indent is handed in the day before, and the supplies assembled during the afternoon. When the Corporal and his detail come the next morning he merely gives the name of the unit and everything is ready for him.

These Detail Issue Stores vary in size and scope. Some only issue to fifty men, while others carry rations for sixty thousand. One detail in connection with them is of unique interest. Since all the stores carry rum in stock, it is necessary to protect it from the ever-present thirst of the soldier. The cases of rum are never marked with the name of their real contents. They are stamped with a secret mark, which is changed from time to time and only known to the officers and sergeants in charge.

We are ready to start on the first lap of the journey of the food to the front. Our objective point is the Advanced Base Supply Depot. Behind us at the Base ports we have left the din of the docks, the bustle of unloading, the spectacle of the busy hangar—the whole humming round of packing and unpacking.

As we go forward into the Domain of Distribution we find that with army supplies life is just one repacking after another. But every cycle of it has such a definite place in a definite system that no time or labour is lost.

An Advanced Base Supply Depot is the place where the bulk trains are unloaded and the freight reloaded into sectional trains that then go on to the front to supply the armies in action. The unit of supply for distribution to the front is a Division, which, at full strength, is 20,000 men and 5800 horses. This is why the train that goes up to the fighting line is called the Standard Divisional Pack Train. Each train carries enough food to supply two complete Divisions for a day.

The average number of trains loaded daily at an Advanced Depot is twenty-one, which means that the normal establishment sends up food every twenty-four hours for 840,000 men. During the temporary breakdown of one of the northern ports a certain Advanced Base Supply Depot had to take over the work of another similar station, and for two months it fed 1,300,000 men every day.

You cannot explain the work of an Advanced Base Supply Depot, however, without also explaining the functions of a Regulating Station. These two establishments are affinities. One is absolutely necessary to the other. The reason is that the Divisional Pack Trains are only made up in part at the Advanced Base Supply Depots, where the groceries are packed and completed at the Regulating Station, where, as you have already seen, the bulk petrol, forage, fuel and meat trains arrive direct from the Base Supply Depot. Each bulk train contributes its quota to the Divisional Pack Trains. When the latter leaves the Regulating Station it has its full authorized quantity of supplies for the two Divisions it feeds. This means that it carries food of all kinds, including meat, fuel, forage, petrol, medical comforts, small ordnance stores,

disinfectants and a postal car, because letters are almost as welcome as things to eat.

The moment you touch the trains you encounter another one of the compact organizations whose work helps to make up the sum total of army supply in France. Without adequate steam transportation facilities nothing could be accomplished. The British have had to take over, reorganize and regalanize the whole railway system of Northern France. All operations are under the control of a Director-General of Transportation, General W. A. Nash, a seasoned railroad man, who has under him an army of trained railroad men from all parts of the Empire. This organization was literally put on the map by that remarkable individual, Sir Eric Geddes, who has become England's Handy-Man for all jobs, and who is now First Lord of the Admiralty.

From a château from "G.H.Q." General Nash runs the trains from Base to Railhead. All the lines are subject to army control. It is just as if the New York Central, the Pennsylvania, the Reading, the Baltimore and Ohio, the Erie and the New York, New Haven and Hartford had all been mobilized for army work, and were under the direction of the War Department at Washington. In order to haul the immense quantity of supplies hundreds of engines have been brought over from England and Canada. They are all marked R.O.D., which means Railroad Operating Department. Thousands of freight cars have been commandeered from every line in England. They are stamped "W.D.," which means War Department, and also show a white arrow, which is the symbol throughout the War Zone of that mighty organization.

Some notion of the scope of army railway operations in France is obtained when I say that the average daily number of trains operated is 220 and that the number of loaded cars conveyed each week is 35,000. These are standard gauge trains. The British Government also operates hundreds of miles of so-called light

or narrow-gauge railways, which often run almost up to the trenches. They carry food, ammunition, engineers' stores, broken stone and other material for road-making, and trench supports, both wood and iron.

The system in operation at an Advanced Base Supply Depot is a model of time and labour saving. All goods are loaded and unloaded on what we would call a freight shed, flanked by railway tracks. The incoming bulk train stops on the track outside the shed and its groceries are loaded on to the platform, where each kind of commodity has a section or block, which is numbered. Each block holds thirty days' supply of that particular commodity for one Division. Let us say that Sugar Block, for example, is number Six. All trucks loaded with sugar, therefore, are stopped opposite this Block.

On the other side of the platform are the empty freight cars of the Divisional Pack Train. Its sugar truck is put alongside Block Six. Thus only two operations are required to unload the sugar from the bulk train and get it into the sugar truck of the Divisional Pack Train. The same is followed with all commodities.

Perishable supplies are kept in the shed. Just beyond the tracks where the Divisional Train unloads is a huge open platform where non-perishable goods, like canned goods, are kept. This is unloaded in bulk and piled up in numbered Blocks. The performance at the shed is repeated here ; that is, cars are matched to Blocks. It would be difficult to find anywhere a system simpler than the one I have here tried to explain.

Each train has a Loading Officer, who gets each morning a long form filled out with the necessary articles to be packed. After the train is loaded he signs the form, which is checked in turn by a Checking Officer, and it becomes part of the permanent record of the transaction. At the Advanced Base Supply Depot each Division supplied gets a number. If a

train steams out with 83 on its trucks it means that this is the number of the Division whose food it carries. When it gets to the Regulating Station a corresponding group of freight cars bearing this same number are switched on behind, and the Divisional Pack Train, now complete, goes up the line to Railhead.

With this Divisional Pack Train goes a series of Waybills. One of these is signed by the Railhead Supply Officer, who sends it back to the Advanced Base Supply Depot as a receipt for the goods. Another duplicate is kept by him for his stock records. Still a third remains behind at the Depot.

Go to a Regulating Station—it may be five or thirty miles from the Advanced Base Supply Depot—and you will find yourself in a maze of ceaseless traffic. Day and night scores of trains come and go, hauled by nervous puffy engines. On the network of tracks—called the Triage—everything seems to be in confusion, but, as a matter of fact, it is all part of a perfectly attuned system. At every Regulating Station the Traffic Manager sits at his desk with a huge blackboard before him, on which every incoming and outgoing train is marked. Although he may wear the uniform of a captain or major, it is purely a temporary rank. Before the war he was an operating official on the London and North-Western or the North-Eastern or some other great English railway. He knows his job.

At these stations trains are literally regulated. Hence the title. Every Traffic Manager in charge keeps what he calls Plus and Minus Books. If an extra sugar or tinned meat or gasoline car comes up it is registered in the Plus Book. If by any chance a sectional Pack Train arrives with a car short it is recorded in the Minus Book. What is more important, the gap in the train is at once filled, and without delay, from the extra loaded cars that are kept on what is known as the Surplus Track.

A complete set of Divisional Pack Trains is handled

every twenty-four hours. I mean by this that, beginning at sunset each evening, the battalions of trains begin to steam away from the Regulation Station up to the Railhead, where they are scheduled to arrive at dawn. Just as soon as one group of these trains leaves the station another instalment of bulk and partly-packed trains begins to arrive. It is an endless round of traffic.

No train returns from Railhead empty. It brings back clothing, shoes, guns, ammunition and engineering stores to be salvaged or renewed.

When you reach the Railhead you are in the Zone of the Armies. You have gone as far as the railway dares to go. Indeed, more than one Divisional Pack Train has arrived at its destination to be met by an avalanche of shells and smashed to bits. From this time on you are up against danger and death; the whole system of subsistence is exposed to a hundred hazards.

Yet despite every difficulty that besets the Lines of Food Communication the accounting and supervision go right on. The Railhead Supply Officer keeps a Daily Stock Sheet, upon which he enters the supplies he receives from the Divisional Pack Trains, and deducts the Issues that he makes.

The Railhead may be the shattered railway station of a ruined French town or an improvised open-air freight yard. The steel rail follows the advancing armies. What was the scene of a bloody battle one month may be an important railway distributing point the next.

At the Railhead a Reserve is kept on hand to meet emergencies. Wherever you go in the whole scheme of British supply you find the Reserve, which is the bulwark against breakdown in transport. This Railhead Reserve is renewed every month because some of the goods are likely to spoil. It is kept under canvas, which is heavily camouflaged.

The active supplies which arrive every morning are

loaded into squadrons of motor-trucks, technically called the Divisional Supply Column, which hauls the supplies to the Refilling Point. Now you encounter Mechanical Transport for the first time as an active accessory of the Armies of the field. Frequently it must do all its work at night, because it is often the target of the long-range German guns and the aeroplane.

The Refilling Point marks the last stage of Mechanical Transport. As the danger becomes greater and you get nearer to the fighting the means of food conveyance must adapt themselves to the perils of the situation. The roads are now so bad that even if there were no shells flying about a three-ton motor-truck could never get through. The army prop becomes the horse and the mule. Henceforth, and up to the time the food is actually delivered to the fighting units, it is conveyed by the Divisional Train which is Horse Transport. A Divisional Train consists of 455 men, 375 animals and 198 wagons.

With the Horse Transport you get the really spectacular contact with the firing line. Day and night it is almost constantly under fire. A German gunner would rather "pot" a food column than a trench, because it works a greater hardship. I have seen the roads strewn with the debris of wrecked Supply wagons and black with the bodies of dead horses. More than 200,000 horses have been killed in France alone since the war began. Most of them were in the Transport, because very little cavalry has been employed.

At the unit, which is usually a battalion, the food is unloaded from the wagons and taken in charge by the Battalion Quartermaster, who divides it into five lots, one for Headquarters and one for each of the four companies. In the company the Quartermaster-Sergeant puts it up in sacks and gives it to carrying parties, who convey it to the trenches.

The manner of cooking depends upon the stage of fighting. The food is sometimes cooked behind the

lines and carried up at night by hand in "dixies" or large food-containers. It may be cooked in the Communication Trench or in the Front Trench itself. The main essential is that the Horse Transport delivers the supplies to the Battalion and the unit must do the rest as the circumstance of war dictates.

I made a journey last autumn from a Railhead to the trenches. It was in the historic valley that British valour has glorified into one of the supreme and spectacular spots of the war, where half a dozen Gettysburgs have been fought and won since Haig began his victorious onward sweep. On either side flowed the rivers that will have imperishable names, for the Ancre and the Somme are part of the agony and sacrifice of the great struggle.

Six months before I had seen that same region white with snow, yet blazing with death. Two mighty armies were locked in a terrific struggle. The hill-sides were gashed with trenches, the roads blocked with ammunition convoys. Everything was dedicated to destruction.

When I went back the British advance had left this one-time battleground far behind. Where the big guns had roared was now a Refilling Point. Not many miles to the rear in the little city that vies with Ypres as the theatre of heroic endeavour a Railhead had been established in the wrecked railway station. Motor-trucks were lined up at the platform for their daily supplies, mountains of forage towered in the public square, now a mass of wreckage; in the ruins of the houses where once the citizens smoked and lived their uneventful lives Royal Engineers were rearing stables to protect the supply of horses from the rigours of the winter so near at hand. A Community of Supply had suddenly sprung up amid a wanton waste. There was still a suggestion of close proximity to war in the boom of the far-away guns, but that was all.

The valley beyond was a flower garden. The

furrowed hill-sides¹ blazed with poppies; the shell holes were rippling pools of yellow mustard plant. Nature had "come back." Only the men sleeping in the graves by the road-side would never return.

To return to practical details, the question that the average man would ask at this point is: How does the Advanced Base Supply Depot or the Railhead Supply Officer or the Refilling Point Officer know just how much food and fuel to carry? With shells shrieking all over the place an excess supply would invite unecesssary loss. Again, no chances can be taken in underestimating the needs of the men fighting for their lives.

²You have only to look a little further into the supply system to see how it is done. Every one of the five British Armies in the field has a Deputy Assistant Quartermaster-General and a Deputy Director of Supply and Transport. The latter is the link between the Demands of the army on the one hand and the Source of Supply on the other.

A battalion up front makes its Demands for supplies on the Brigade Supply Officer, who in turn "Demands," as the phrase goes, on the Senior Supply Officer, who is the Supply Officer of the Division. He renders a Consolidated Demand on the Railhead Supply Officer. If the Division is recruited to full strength it means that he wants daily supplies for 20,000 men and 5000 horses.

The Railhead Supply Officer thereupon issues in accordance with this request from the stores he receives each day from the Divisional Pack Train. He sends a "Daily Wire of Feeding Strength and Reserve" to the Deputy Director of Transport with the army, who makes a formal Demand for all the supplies needed on the Advanced Base Supply Depot. In other words, the battalion in the trenches ultimately clears its needs through the Headquarters of the army to which it is attached.

What happens when Divisions change? Brigades

are being constantly shifted from service in the trenches to Rest Camps in the rear. They usually come down very much depleted in ranks, and do not require as much food as the fresh brigade that has just gone up to relieve them. It is up to the Senior Supply Officer immediately to acquaint the Deputy Director of Supply and Transport with the change, so that it can be noted in the issue of supplies.

Let us assume that the Division has lost 10,000 men, and that its Transport is all shot to pieces, having lost 2800 animals. This means that it goes back to rest with 10,000 men and 3000 animals.

The Senior Supply Officer simply wires: "X Division feeding strength, men ten thousand, animals three thousand," and the Advanced Base Supply Depot immediately adjusts its Pack Train to meet the change in needs.

A specific report is made on all supplies salvaged or captured from the enemy. If these are fit for consumption they are used up at once, and the units consuming them underdraw on their supplies from the Base.

Every possible precaution is taken against food disaster. There is always five days' reserve for each Division at Railhead and a reserve at the Horse Reserve Park, where the extra Horse Transport is kept to renew horses. These reserves, together with the Iron Rations of the men, constitute a sufficient safeguard against a breakdown in train service which, at the worst, would not last more than three or four days.

Now you can see why Tommy never misses a meal.

For the last I have kept the chapter in the story of Army Supply, which from the point of view of American business is more important perhaps than any other. It concerns the check on waste, which extends well up into the fighting area. Aside from the fact that it saves the British Government millions of dollars every year, it points the way to a tremendous conservation of financial and material resources in connection with

our own military operations abroad. It has a world-wide significance, because it touches the two universal institutions—human nature and the pocket-book.

During a great war, and while the nation is thrilled and touched by the news of the front, no one questions the cost. Everybody has some kind of stake in the struggle. But when the war is over, and the fixed charges on glory in the shape of taxes and other demands must be met with irritating and costly regularity, the unpatriotic and unromantic question arises : " Where did all that money go ? "

Scandal lifts its fearsome head. Boards of Inquiry become the habit, and good names are besmirched. It is not war that constitutes the graveyard of reputation, but the investigation that comes afterwards.

The British Army is taking no chances on becoming the target for the scandalmonger when peace sheathes the sword. A remarkable system of auditing and accounting has been in operation from the first day of war that will show the British taxpayer just where every penny of his money has gone. It applies every possible antidote to extravagance. As with Corporations, the greatest of these is Publicity.

There are two separate and distinct curbs on army waste. One operates under the supervision of the Financial Adviser of the War Office, who must render an accounting to Parliament for all war expenditures, and who has a complete working organization in the field which deals entirely with finance. The other is the Investigation Department under the control of the Director of Supply at General Headquarters, which follows up all supplies and sees that the issue of food does not exceed actual consumption.

Take the Financial Supervision first. In a building in a certain French town not a great distance behind the lines is a complete Financial Bureau in charge of a Major-General, who before the war was at the head of a great business. The record of every dollar that the army spends in France (and there is a very large field

expenditure) goes through his office. The voucher for each ton of biscuits that lands in France must pass his scrutiny and show that the food is either in stock or eaten.

Every day—as General Pershing has already learned to his cost—some sort of claim is made by the French for damages. If a pig is run over by a motor-truck the peasant immediately sends in a claim for a thousand francs. The usual French claim of this kind ranges from ten to twenty times the real value of the damaged goods. Every pig destroyed, according to the owner, could do everything but talk. All these claims must be investigated and paid. Likewise the immense bills for billeting must be audited.

Everything is investigated. If an officer's car is smashed up, a Board of Inquiry sits on the case to find out if the accident was due to carelessness or the natural hazards of congested road traffic in the war zone. If it is proved that the accident was due to carelessness, the officer is required to pay the damages; if it was unavoidable it is "Written off" and marked, "To be borne by the public," which means that John Bull foots the bill.

These Boards of Inquiry, which are composed of officers, deal with an immense variety of emergencies. It may be a leakage of gasoline due to rough handling or defective packing; an unvouchered expenditure by a Purchasing Agent; the loss of horse blankets in transit from the Ordnance Base Depot in France to the Advanced Horse Transport Depot, or the destruction of Ordnance stores due to fire. Witnesses are examined, a complete report is made in each case and responsibility fixed.

As soon as it was evident that stationary or trench warfare was likely to continue in France for a long time, it became necessary for the British Army to purchase as much food and forage in France as possible. For one thing it saves tonnage from England and elsewhere. A Central Purchasing Board was estab-

lished by the Financial Department to deal with the field buying which is made by officers, known as Requisitioning Officers, who are attached to each brigade. If these Officers were permitted to buy indiscriminately the competition between them would immediately raise the prices of all commodities. To prevent this there is a separate Purchasing Board with each army. Each Board gets a regular schedule of prices to be paid—it is changed from time to time to meet market conditions—and if the French farmer or shopkeeper does not accept them the goods are ordered from home. This is the guarantee against gouging.

The whole operation of this Financial Department in the field goes to show that although Great Britain spends \$35,000,000 a day on the war a suspicious item of five dollars is rigidly scrutinized. The Watch-Dog of the British Treasury is always on the job.

But this censorship of expenditure is merely the beginning of real supply auditing which constitutes the principal work of the Investigation Department. Here you have the branch of the Business of War which corresponds with the Accounting Department of a business. Its headquarters—located at a bustling French town where an immense number of British supply trains are regulated every day—are just like the offices of a large firm of expert accountants. The duties are almost the same. The only difference is that the men of the "I.D."—as the Investigation end is known—wear uniforms, are subject to military discipline and deal with the biggest business in the world. Most of these officers, I might add, were actuaries, accountants and book-keepers in civil life. At their head is a regular officer, Colonel C. M. Ryan, a Deputy Director of Supply, who, without the slightest previous business experience, runs the whole show just as if he had been trained in trade.

The Investigation Department was started in December 1914. Originally its operations were confined

to the Base and Advanced Supply Depots. It had, and still has, a representative at every Base Depot who checks up the receipts and issues of supplies and acts as Auditing Officer. Losses of supplies from theft, over-issue or on the road have to be accounted for. A monthly stock-taking was enforced and every discrepancy thoroughly investigated. This strict supervision not only means a large financial saving, but is of distinct military value, because it compels all the Depots to keep their stocks shipshape.

In view of the large number of supply trains that shunt back and forth every day it is natural that freight cars should be lost. All these are traced by the Investigating Department. During last July 199 loaded trucks, lost in transit, were run down and their freight restored.

During the summer of 1915 General Carter said to himself, "Why not extend the operations of the Investigation Department into the army areas? An immense amount of supplies in the field of fighting is practically unaccounted for. There is not the slightest reason why supervision should not extend to the field kitchen."

Up to this time the general principle laid down by the War Office was that there should be no accounting for supplies after they left the Advanced Supply Depot. Demands for food were made on scraps of paper and the rudest sort of Indents, while the certificate of Issue and Receipt was often scribbled on the back. Naturally there was great waste.

General Carter's suggestion was adopted by the Quartermaster-General to all the Forces, and an Administrative Control was established which literally represents the last word in Supply Supervision, because it follows the goods up to the point of consumption.

Forms were standardized and the whole system of "Demanding" by troops at the front, which I have described earlier in this chapter, was put into

effect. The haphazard methods disappeared, and the whole process put on a definite business basis.

Over all this unending procession of Supply the Investigation Department keeps vigilant watch. It gets a duplicate of every Indent for Rations—55,000 of these come in each week alone—a copy of every receipt for supplies delivered and a carbon of each Waybill used throughout the traffic system. Into its office pours a flood of documents that record every transaction that relates to the issue of food to the British Armies in France.

The main job, therefore, of the Investigation Department is to reconcile Issue with Receipt. Each commodity issued must register 100 per cent, which means that every pound of it must be consumed or be in a Reserve. If there is a serious discrepancy the officers responsible are likely to be severely disciplined.

So automatic has become the working of demand and supply that during the month that I spent with the British Armies the Reconciliation Percentage of twenty-three leading commodities did not vary more than 1 per cent. in surplus or in shortage. In practically every case it was considerably less than 1 per cent. Over-issue, which always means waste, is eliminated.

Thus the Business of War is more than a phrase. It is as efficient as it is destructive.

V

THE MIRACLE OF TRANSPORT

WHEN the real story of the Great War is written the technical experts will probably call it a War of Artillery, but the men who have had to battle with the business of it will always know it as the War of Mechanical Transport. The whole marvellous Empire of the Motor has produced no greater miracle than the achievement of the gasoline-propelled vehicle which has made possible the feeding and purveying of the enormous fighting hosts. Indeed, Supply and Transport are so closely related that one cannot exist without the other. They are the real affinities of the service.

Since an historic evening early in September 1914, when General Galieni's reserve army swept out of Paris in taxi-cabs, joined Joffre's forces, helped to deliver the crucial blow that blocked the Germans at the Marne and saved the capital, the automobile has been a constantly increasing factor in the waging of the war. In this particular case it provided the pivot on which the whole Allied Cause turned. If Paris had fallen then before Kluck's drive no man knows what might have happened. The abused taxi earned its crown of glory that night.

No phase of the British Army organization in the field is of such vital significance to the United States as Mechanical Transport. Here you get the direct link with America, because thousands of our cars of all kinds are in constant use in the War Zone. But more

important than this is the tremendous lesson in standardization, both as to vehicles and their parts, that has been learned by the British after three years of costly and drastic experience. By heeding this lesson we can save millions of dollars, to say nothing of infinite trouble. Simple and standardized Mechanical Transport is half the battle, because it not only means adequate food supply, but also guns, ammunition, aeroplanes and engineers' stores.

Under the terrific pressure of army needs the utilitarian side of the motor, from cycle to five-ton truck, has been reorganized and given a rebirth of efficiency. Three years of war have advanced the industry more than ten years of peaceful investigation. The results are of almost incalculable benefit to the entire business. They furnish one of the many stimulating examples of regeneration wrought out of monster destruction.

Like the army it serves, British Mechanical Transport has developed from almost nothing into a mighty machine. Prior to this war the motor-truck, as a practical aid to operations in the field, did not loom very large in the mobilization plans. In the Boer War all the transport was drawn by horses, mules or oxen. In 1910 a few steam-propelled trucks were introduced as experiments, but they were rather impracticable on account of their weight, slow speed and the inevitable difficulty of fuel supply in actual war. The Mechanical Transport was controlled by the Transport Branch of the War Office and consisted of a very small personnel and an equally limited number of vehicles. The War Office relied for the provision of motor transport, in the event of the mobilization of an Expeditionary Force, on trucks already in use in civil work whose owners had been subsidized and who were, therefore, bound to turn over their equipment at the outbreak of war. For the expansion of the personnel this plan depended upon the direct commissioning of experienced civilians for officers and the immediate enlistment of civilian drivers. No provision was made for training men in

discipline or military routine. Such was practically the main Mechanical Transport resource of the British Army before the war began.

Under this scheme the mobilization of motor units was entrusted to the Commanding Officers of the various ports of embarkation. These officers were provided with lists of the vehicles which were to mobilize at their depots. The owners of these vehicles were instructed by telegraph just where their trucks and cars would be required. For the provision of spare parts a system of subsidy, similar to that in vogue for the supply of complete vehicles, existed. Efforts were made to encourage manufacturers to standardize parts and fittings to as great an extent as possible.

When the war crashed into civilization this arrangement was not found entirely wanting. The trucks that first supplied Lord French's army were taken from trade. They went from shop, warehouse and factory to flat cars, were hauled to the southern ports and rushed to France. These scattered and impressed vehicles formed the nucleus of the immense fleet of transport comprising thousands of trucks, cars and motor-cycles—50,000,000 pounds of equipment on rubber tires—that to-day makes up the Mechanical Transport of the British Armies in France alone. The transport in the other theatres of war augments this list considerably.

As a matter of picturesque fact, however, the British Mechanical Transport in France on any kind of scale really began with that lumbering engine of peace, the London omnibus. At the outbreak of hostilities thousands of them were literally taken from the Strand, Piccadilly and other streets of the Metropolis and shunted into the war area. They were used to convey the "Old Contemptibles," as the first immortal army that dashed to the relief of Belgium was called.

In connection with their advent in France occurred one of the most amusing incidents of the war. Since

these buses were rushed from the highways of peace into the Zone of War they appeared on the French roads carrying all the advertising that had become familiar to the London population. The virtues of soaps, matches and safety razors were still extolled on their sides. At that time "Potash and Perlmutter," rendered into a play, was having its first big run at a well-known London theatre. Nearly every London bus carried a huge sign which read: "See 'Potash and Perlmutter' at the Queen's Theatre."

This injunction in huge letters burst upon the unsuspecting people of France. When the first line of buses filled with British Tommies swept up the road to Mons the French soldiers and civilians stood at attention on the road-side and yelled:

"Vivent les Généraux Potash et Perlmutter!"

They thought that the names of the famous Jewish merchants were those of the British Generals in command of the Expeditionary Force.

Soon after the outbreak of the war Mechanical Transport, or "M.T.," as it is known in the service, was detached from the Transport Branch of the War Office, entrusted to a separate branch of the Quartermaster-General's staff and mated to the Department of Supply. This is why Major-General A. R. Crofton Atkins is Director of Supply and Transport in the War Office organization that feeds and provides the British Armies everywhere.

With Mechanical Transport as with Supply, you find a close-knit system that is full brother to the whole process of provision that I have already explained. It is just one more Branch of the stupendous Business of War, organized, sustained and operated on lines that would do credit to the most scientific of industrial institutions.

Your knowledge of the institution of Supply now enables you to grasp at once the scope of the complete Mechanical Transport service. In England you find a perfect system of provision based on actual needs

expressed in Demands sent in from France and the other war areas. In the field you encounter an interlocking chain of Base and Advanced Depots; you see an unfailing process of Supply; you behold a Field Repair service that carries the work of maintenance and reconstruction almost up to the firing line; you marvel at the ceaseless flow of gasoline, and you realize that the whole world of rubber has been drained for the millions of tires required.

Again you have the parallel with trade, because this whole gasoline-driven enterprise is operated just as if it were the annexe of a private business that must be conducted at maximum productivity and with the minimum overhead cost.

At the head of this business is Major-General W. G. B. Boyce, Director of Transport of the British Armies in France, who sits at his desk at General Headquarters with his hand at the wheel of all Mechanical Transport in that field. Every day he knows just the number of trucks and cars that are in active service and their exact condition; how many have been destroyed by enemy fire or accident the day before; the exact state of all motor supply at all Depots, and what new vehicles are on their way to replenish the lost or damaged. In brief, the whole Mechanical Transport situation, through the agency of an almost infallible chain of intelligence, is at his finger-ends. In war knowledge is always power.

General Boyce is a fine type of the clear-cut efficiency that you invariably discover in the high executive British Army places. Without technical knowledge of motors—I doubt if he knows how to run a car—he can detect the slightest deviation in the structure of the very technical organization that he controls. It is instinct. One of his colleagues said: "Boyce can smell out mistakes." I am quite sure that he could take charge of any huge motor-plant in the United States and operate it successfully. Like his



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MAJOR-GENERAL W. G. B. BOYCE
DIRECTOR OF TRANSPORT OF THE BRITISH ARMIES IN FRANCE

stalwart colleague, General E. E. Carter, who rules the Domain of Supply, he is a graduate and member in good standing of the Army Service Corps—a conspicuous figure in the Army behind the Army.

At the outset it might be well to impress the fact that Mechanical Transport in a great army to-day is much more than motor-trucks and automobiles. It includes all ambulances not hauled by horses, motor-cycles, the equipment of the tanks and the huge so-called Four-Wheel Drives which pull the big guns. These Drives are the monster limbers or tractors with caterpillar wheels. In the case of 9·2 howitzers, 12-inch guns and larger calibres they are like travelling machine-shops. All cannon from 6-inch howitzers up come under the head of siege artillery and must be hauled by mechanical transport. Without motors they could not be used in the field. Now you can see why the gasolene engine has made the War of Artillery possible.

Mechanical Transport also includes all the water wagons, which are as important to the sustenance as the food columns. Then, too, there is the tremendous task of providing spare parts, accessories and tires for all the different kinds of vehicles. Last, but not least, of Mechanical Transport responsibilities is the maintenance of a continuous supply of the very life-blood of all motor transport, which is gasolene, or petrol, as the British call it. The only section of gasolene transport not under General Boyce is the equipment of the Royal Flying Corps. This is because the aviation lorries, which is the English synonym for trucks, must be of special construction in order to carry complete aeroplanes.

All vehicles, their parts and accessories, must be provided from hundreds of factories in Great Britain and the United States, mobilized and manned in England, conveyed to France and other areas of war and kept going day and night behind the lines and

under fire. Like the organization of the Army Food Supply, it seems like an almost impossible proposition, but it is all reduced to charts and diagrams, vitalized by an amazing administrative genius and made into an agency whose operation is as simple as it is efficient.

On a chart about three feet square, which hangs on the wall in General Boyce's Office at General Headquarters, is a lay-out of the whole system from factory to field. At the bottom is Production, which may be factories in the United States or England. Next in succession come the Home Depots in England, where the mobilization of transport, drivers and mechanics is effected. Beyond this lies France, where you go from the Base Mechanical Transport Depots to the Advanced Mechanical Transport Depots, past the Heavy Repair Shops and Tire Presses, up to the Mobile Work Shops in the field where the cars damaged by shell fire or wrecked on the roads in the zone of the armies come for repair.

Everything on this chart is so comprehensive that it is like a tale told in words of one syllable. The English Depots are all in yellow, the Depots and shops on the Lines of Communication are blue, while the stations in the field are pink. On one side is a succession of compact texts which explains the functions of every stage in the system. You can look at this chart and see at a glance just how the whole organization of Mechanical Transport lives and has its being. With this bird's-eye view of operation in your mind you can now go into specific details.

Let us first examine the Production End as it affects men and motors. The rank and file of Mechanical Transport must, of necessity, be more skilled than any other branch of the Army Service Corps, from which its entire personnel is drawn. All men who enter the army and who have had previous experience as chauffeurs are mobilized at once as drivers. But the number of trained volunteers and

conscripts is unequal to the enormous demands of the Army Transport Service.

Two huge Mechanical Transport Depots had to be established in England. At one of them the men are examined as to their qualifications. If a man says that he knows how to drive a truck he is immediately put on the seat of a five-ton lorry and made to prove that he can deliver the goods. At the first of these Depots the men are cross-examined, weeded out and equipped. They then proceed to the Training Depot, where the experienced chauffeur is put through the paces with every form of army vehicle from truck to Four-Wheel Drive. The green driver gets a complete course of technical instruction. No one is permitted to leave the Depot to serve as driver in the field until he can manage the biggest truck on a crowded road in the darkest night and can repair his engine under all sorts of disquieting conditions.

The faculty in this Automobile College is composed of temporary officers who have been employed in the great automobile factories of England and also hundreds of men from the technical staff of the London General Omnibus Company. Recruits who are unsuitable as motor drivers become loaders and packers and remain in the Army Service Corps. This Automobile School becomes the source of man-power for the Mechanical Transport. The drain on this man-power is very great, because of the constant stream of new vehicles that pours from England into France and the steady losses in the field.

Now we can turn to the Vehicle End. Every week scores of trucks and cars arrive in England from America. Some of the equipment from the United States comes in the form of a chassis upon which a British body is erected. At the same time every automobile factory in the United Kingdom is working day and night on army motor output. All these vehicles and cars are assembled in what is called a Vehicle Pool. Just as soon as Demands for trucks

come by wire from France each vehicle is manned with a driver and an extra man from the Training Depot and sent on its way.

These two men remain with their truck until they, or the truck, are destroyed. Each driver is required to keep a Log of his car. Into it he must record the amount of fuel he uses, the number of tires and spare parts he requisitions—in short, the whole story of what his vehicle does.

Every truck gets what is called a War Department number. The chassis also gets a number. These two numbers are permanently attached to the car and provide the means of identifying it throughout the army records. The truck or car and its numbers become part of an endless system of observation and accounting which continues until the vehicle goes into the scrap-heap and is written off the books. Some of the lorries used by the First Expeditionary Force are still in service, and it is interesting to add that they include some well-known American makes.

The vehicle is only one phase of the Production End in England. Near London is an immense spare part and tire Depot—the largest in the world. Within its walls seven million parts are “turned over” every year, yet there is a record of each one.

How does the Production End know just what equipment to provide? I will now explain.

Despite the immense scope and variety of the Mechanical Transport there is a definite allotment for every Branch of the Service. A Battery of 6-inch howitzers, for example, is entitled to four Four-Wheel Drives and fifteen trucks. It can have no more—no less. Eight of these trucks are used for ammunition, three for baggage, two for gun platforms, one for supplies and one for spare parts. Every one of these batteries is charged up with this mechanical equipment and must render an accounting.

The same is true of the trucks of a Divisional Supply Column, which hauls the food from Railhead to

Refilling Point in the field, and the Ammunition Park which carries shells. Likewise every Base and Advanced Supply Depot has its quota of trucks and must maintain it. If this number falls below standard it must be renewed at once.

Hence it is important for the Director of Transport to know what is technically called the Supply Situation every day. From every unit that uses motors of any kind he gets a report at "G.H.Q." He therefore knows precisely what he has on hand; what destruction has been wrought and what Demands must be made upon reserves in France and upon the Vehicle Pools in England.

Take the case of a Big Push, which usually plays havoc with Mechanical Transport. A heavy bombardment may destroy fifty trucks and forty Four-Wheel Drives in a single day. A report of this loss is wired to the Director of Transport, who replaces the lost vehicles from the Reserve Park in the Field. He immediately makes a Demand on England for enough Transport to fill up the gap in the Park. The Reserve Vehicle Park bears the same relation to Mechanical Transport that the Authorized Reserve bears to Food Provision. It is the bulwark against disaster, an automatic insurance against delays and breakdowns. Throughout the whole organization of Mechanical Transport you find that Supply and Ordnance Stores history repeats itself. Nothing is permitted to remain a loss. Swift renewal is the watchword up and down the line.

We can now cross to France and see how the whole Mechanical Transport Machine works. At once you find it linked up with the Supply and Ordnance organization, for which it fetches and carries. In other words, it is part and parcel of the general provision geography of the whole war area. This means that the Base Mechanical Transport Depot on the Northern Line of Communication is located in the chief Supply port of that Line and serves the armies

in the area, while the Southern Base Mechanical Transport Depot adjoins the Base Supply Depot of the Southern Line and serves the British Armies located in its zone. The organization of both Base Mechanical Depots is practically the same, but each has its distinctive elements of interest. Therefore we will visit both.

The Base Mechanical Transport Depot for the Northern Line is of particular concern to the United States, because it supplies all the American cars used by the British Armies. Go into its huge counting-room—it looks precisely like the office of a great factory with its clicking typewriters, card indexes, ledger accounts, adding machines and other aids to business—and you will see on the diagrams that hang on the wall the familiar names that have made American motor history, and which are now geared up to the world automobile machine. It makes the Yankee visitor feel that he is back home.

Typical of the completeness of this Transport organization is a large Blueprint which outlines the duties of every one of the many sections. If a supply clerk is required to make out triplicates of every Demand for a spare part that comes in it is indicated here. Everybody knows what is expected of him.

At one of these Bases you get a touch of the real human interest of the war. You see a crack motor designer who earns \$15,000 in England making Blueprints for a subaltern's pay. You find an automobile production engineer who set his own fees in peace-times speeding up the supply output, content with the wage of a captain. Here, as elsewhere in the Army Service Corps, expert brain as well as brawn is enlisted on the army job.

A Base Mechanical Supply Depot in its work plays many parts. It receives all the reinforcements—drivers and mechanics—for the field; it checks all the new vehicles that arrive from England; it has a school of instruction which gives the final intensive

training to slightly deficient chauffeurs, and it is the clearing-house for all obsolete or wrecked-beyond-repair vehicles.

But the greatest of its functions is the issuance of all spare parts and tires. Now we come to the really difficult and complicated problem of all Mechanical Transport—the one that is at once its bane and its salvation, and the one, I might add, which points the greatest of all constructive morals for the infant Transport organization of the American Army now in the making.

If you know anything about automobiles you know that any motor vehicle, whether it is limousine, touring-car or truck, is the sum of a great many so-called parts. In the case of one of the best-known American motor-trucks used in France there are exactly 1140 parts. These parts may be as small as a nut or as large as an axle. Nearly every model of car or truck has its own particular set of parts or "spares," as they are known. It follows, therefore, that very few of these parts are interchangeable. You cannot renew X car with the spares of Y car. If you are dealing with the renewal and upkeep of a great many different makes you must provide a separate supply of spares for each make of car, and also for every type of that make.

Now, if the British Army only used a few makes of cars and a few different types of these makes, the renewal of spares would be a very simple business. But this, unfortunately, is not the case. England went to war almost overnight. As you already know, she had paid very little attention to the organization of her Mechanical Transport. There was no standardization; in fact, no vehicles to standardize. The comparatively small group of cars commandeered for the First Expeditionary Force represented nearly a dozen different manufacturers, each one with his own particular set of spare parts.

War does not wait. The army had to have hundreds

of trucks at once. They were gathered in from every possible source. America was scoured for them, with the result that before six months had passed there were more than fifty different makes of car-trucks and cars in France, and in many instances half a dozen or more types of each make. In the case of one British truck extensively used in the army there are exactly sixty-seven types, which call for more than four thousand different parts.

Since the organization of one Base Mechanical Transport Depot and up to the end of July 1917, 210,000 items have been Demanded by units in the field alone. This does not mean the quantity of parts, but the number of items. If a unit Demands six pistons for a lorry and four connecting-rods for a touring-car the number of items recorded is not ten, but two. The number of articles involved therefore runs into the millions.

The colossal task of transport renewal is now apparent. I could give you no better idea of the immense scope of this work than to say that at the Base Mechanical Transport Supply Depot of the Northern Line the number of different non-interchangeable parts that must be carried in stock is exactly 32,000, and that the total stock comprising these parts includes 1,700,000 articles. In one year this Depot supplied 2,500,000 spares, and this merely represents the spare demands of one Depot. Altogether the Supply Depots in France are required to keep on hand during the course of a year not less than 70,000 different non-interchangeable spares and in some cases a great number of each item.

When you consider that there must be a separate bin for each kind of "spare" and a complete record for each part issued, that in a single day Demands often come in from the Field for two or three hundred items, that every one of these mechanical fixtures must be kept constantly renewed, you get some conception of the intricacies and the hardships that attend adequate

and continuous supply. Yet in the face of all these handicaps no truck or car has ever been required to wait more than twenty-four hours for its spares. It is a tremendous tribute to the efficiency of the whole Supply organization.

Right here you get the significance of the lesson for America. By adopting a few standard trucks or cars with interchangeable parts at the very outset of its war operations the United States Government can save itself infinite time, trouble and expense in its Mechanical Transport. The same thing is true of aeroplane engines. Standardization—ancient middle name of American business—would work wonders in every branch of the army that has to deal with a gasoline engine.

The procedure of motor part renewal is very simple. The units in the field make their Demands through the Advanced Mechanical Transport Depot. If the part is not available from stock there, it is secured from the Base. The Advanced Depot, however, only renews the cars in the actual zones of the armies. The damaged cars that come to the so-called Heavy Repair Shops and the cars used in all the Base and Advanced Supply Depots are supplied from the Base Mechanical Transport Depots.

In view of the immense number and variety of parts, every precaution is taken to ensure accuracy in the original Demand. Every Mechanical Transport Supply Officer in the field is required to pass an examination in a book called *The Demand for Spare Parts*. This is the Bible of "M.T." renewal. It contains a simple description of every part used, its purpose and how it is ordered. Specimen Demand Sheets are printed. It is as near fool- and mistake-proof as possible. If the officer is ordering a rear axle he is required to give the War Department number of the car and also the chassis number. These numbers are a part of the Mechanical Transport Census, which is in the library of every Base and Advanced Mechanical

Transport Depot. If the Demand is in any way obscure the Census is consulted, the exact car is located and the proper axle furnished. In this illustration I have used a very large part, but the same process would apply to the smallest part. Every spare and accessory has a number and it is ordered by that number.

In order to reduce the possibility of error in spare supply to a minimum, and to enable the Demands for parts from the units in the field to be dealt with promptly by non-technical and perhaps eventually by female labour (women are succeeding soldiers wherever possible in all Supply and Transport Depots in order to release fighting men), it has been found necessary to have a staff of technically trained men to scrutinize every Demand, to verify its accuracy and to ensure that the parts shipped are suitable for the vehicle for which they are intended. The men who do this work are called Scrutineers. After deciding that the item demanded can be legitimately supplied, the Scrutineer marks its catalogue number on the Demand in red ink, which locates it at once in the Ledger or Stock Account of the Depot and enables the correct issue to be made in the Store. This is merely insurance against the possibility of mistakes in numbers.

In order to assist the Scrutineer in his work Makers' catalogues of spare parts were formerly used, but these were found to be so inaccurate that what is called a Vocabulary has been compiled by each Depot for its use. This Vocabulary is one of the many distinct and permanent contributions that motor transport operation in the war is making to the development of the whole automobile business. Each Vocabulary is a sort of encyclopædia for the particular vehicle with which it deals. It contains a complete list of each and every part, its description, its part number, the quantity used per vehicle and, finally, the card number which identifies it in the Depot Ledger account.

These are the purely formal details. More important

is the information as to the interchangeability of the various parts, so that when a certain spare is out of stock another from another car can be issued and used in its place. Here is where the vocabulary will be of inestimable benefit to the motor manufacturer everywhere. It will teach the maker of a specific product facts about his own product that he never knew before.

But the Vocabulary contains other information of value to the administration of Supply. As a result of many conferences between the technical officers of the various Depots the stocks of "spares" have been reduced to the fewest possible shapes and sizes, and a drastic censorship of accessories and fittings established. This censorship deals with articles which in time of war are considered as luxuries, and therefore not permissible upon the ground of economy. Thus, only staff vehicles are permitted to have electric-light equipment; others are denied mechanical horns; certain cars are not allowed speedometers, and so on.

In the same way it has been decreed that certain parts must be made by the workshops for the units in the field, in order to keep down the demands on the parts manufacturers. This refers, of course, only to the simplest pieces. If an officer reports that he cannot make these parts he is told that he must or do without them. It makes for conservation.

To sum up, the Vocabulary ensures accuracy of issue, and permits no discrepancies. More than this, it is bringing about a standardization of parts which is one of the greatest possible aids not only to the whole Army Transport Service, but to the automobile manufacturer generally. It is not saying too much to add that the ownership of one of these complete Vocabularies would be an invaluable asset to any motor maker.

To return to "spares" Issue again, all parts are kept in bins in warehouses as nearly fireproof as possible. Every precaution must be taken to protect the stocks, because in the case of those intended for American cars they must travel across three thousand

miles of submarine-infested seas, and any shortage would work a great hardship.

Usually there is one shed or hangar for every two makes of cars. The sharpest check is kept on the state of supply. Hence alongside each bin hangs what is called a Provision Card. It is very much like the Tally-board which is used to record the state of the stocks of supplies in the Base Supply Depots. On this Provision Card is written the name of the part, the vehicle for which it is intended, the name of the maker, the horse-power or type, and the part number in the catalogue of Stores. Under this is a specific list of Demands made up to date for this part, the number issued, the amount of stock on hand and the last order on the Home Depot in England for renewal of supply. An officer walking through the shed can thus appraise the supply situation in a very few minutes. Every Depot keeps a two months' supply of every item, the supply being based on the average monthly consumption of the three preceding months.

Four vouchers are issued for every spare. One goes with the article itself, another remains behind at the Depot, while the other two are sent by post to ensure the arrival of some evidence of the shipment. One of these is signed by the consignee and returned to the Depot as a receipt. He keeps the other for his own records.

One iron-clad rule of supply gives a sidelight on the curb on waste. No new spare part is issued until the old part is tendered in exchange. If the part is destroyed, a complete report on the manner of destruction is required.

The whole business of spare supply has developed a curious kink in human nature. During the past three years army experience has proved that every transport column has a tendency to hoard spare parts, which is a more or less unfair procedure, because the whole Supply organization is based on furnishing actual needs with a fair reserve for emergency. In order

to prevent hoarding, every unit is required to keep a record called Stock of Spare Parts, on which must be recorded the exact stock on hand, the unit requirements and any surplus. These sheets are inspected periodically by officers who not only scrutinize the sheet, but compare the figures on it with the actual supply. The hoarder never gets away with it.

After spare parts the most important supply detail is rubber tires, which are as essential to the well-being of Transport as gasoline. These tires must be safeguarded in every conceivable way. They are kept in darkened sheds, because exposure to steady light has been found to be injurious.

These tires are arranged in long racks that reach to the ceiling. If you desire some idea of the part that rubber is playing in the conduct of the war, just inspect one of these warehouses. At one British Base Mechanical Transport Depot I saw 44,000 pneumatic tires, 40,000 inner tubes and 17,000 solid tires for trucks under one roof. The value of rubber tires at another Depot that I saw was \$3,750,000, and this, you must remember, is merely one small item in the expense of Mechanical Transport.

Compared with the issue of spare parts the supplying of tires is child's play. Each truck or car carries the usual number of extra tires, which tides them over any emergency. These portable stocks are renewed from time to time.

In order to facilitate the work of renewing solid tires huge engine-driven tire presses are scattered throughout the army zone. Every truck driver has a map showing the location of these presses. If he breaks a tire on the road he makes a bee-line for one of these first-aid stations, has his tire pressed on, and goes about his business. If, by any chance, he has no extra tire, he can get one at the press, sign for it, and it is charged up to the account of his unit.

Spare parts are not the only troubles that beset the Mechanical Transport Depot Officer. The staff of

one of these Depots is constantly being called upon to provide a variety of articles that tests ingenuity to the last degree. Unexpected needs develop, for example, in connection with the water tank wagon. As you may well imagine, every possible care must be exercised to safeguard the water that Tommy drinks. Before making one of their well-known "victorious retreats" the German has a nasty habit of poisoning wells. Even if the Boche did not tamper with the water supply, there is always danger from spies, who seem to lurk everywhere. No officer, therefore, would think of letting his men drink out of a well in a new area without having it tested first. All this means that an immense amount of filtration and purification is necessary.

One day last summer the Commanding Officer of a Base Mechanical Transport Depot got a hurry-up call for filter sand to be used in an active army area. His station had never before furnished such material, but he got on the job at once, because army requisitions must be filled. He immediately detailed a temporary officer who happened to be a chemist, and instructed him to comb the seacoast until he found a suitable sand. The officer located what he wanted, built a small drying furnace overnight, and the improvised filter was on its way to the front the next morning.

At the Base Mechanical Transport Depot for the Southern Line you find precisely the same organization as in the North. Here a whole new industry exists for the salvaging of battered spare parts. Since standardization of parts cannot be completely effected, homogeneity of make is the next best thing. Hence all British makes of trucks and cars are supplied from the Southern Base, which permits a similar concentration for American cars at the Northern Depots.

You cannot leave these Base Depots without finding out how that most essential of all motor supplies—gasolene—is handled. At every Base port is a huge

so-called Petrol Installation. In these immense establishments you discover an efficiency, a co-ordination and a continuity of output that would do credit to the Standard Oil Company. In fact, if you want to discover a real War Octopus, just locate the gasolene end of Mechanical Transport and you will find it.

The whole army petrol supply represents an interesting evolution. In the early period of the war all the canning and reshipping of the fuel was done at a certain English port. This was very easy when the monthly consumption was only 250,000 gallons. But as the armies grew and the fleets of Mechanical Transport expanded with them this system became impracticable. France alone uses up 4,000,000 gallons of gasolene every month; Salonika, 1,500,000; Egypt, 90,000; while 1,000,000 gallons are necessary for the Home Forces.

In 1916 the zone of gasolene operations for France was shifted to that country. The tank ships now go there direct from the Far East and America, pipe their cargoes into huge storage tanks at the ports, whence it is piped in turn to the canneries.

Formerly the standard petrol pack was a fifty-gallon steel drum for the truck and a two-gallon tin for the car. The drum, however, was found to be heavy and costly, and a four-gallon can was substituted. The two-gallon receptacle remains in use for the car.

To keep the armies supplied with "gas" a tremendous industry had to be built up to meet the giant needs. At the beginning of the war most of the hundreds of thousands of cans were made in England and shipped to France. It required such a tonnage that the factories were literally transported to the Base Mechanical Transport Depots. The swiftness of this transition illustrates how war has galvanized every activity that touches it.

Here is an instance of genuine war-time hustle. On a certain Thursday night the largest of these

gasolene can factories was operating in a town in England. Exactly nine days afterwards it was in full swing at a port in France. Every ton of machinery had been moved in that time and set up without mishap. It moved into a series of abandoned factories that had been carefully prepared for the change. Another can factory rose out of a marsh in exactly eight weeks. In this case wooden buildings had to be erected and the machinery assembled in England and shipped over. The construction and operation of these factories in France has released six ships that are now employed for other tonnage.

These can factories work day and night. The operatives are English boys too young to fight, but who are a part of the army organization and wear khaki. Just as soon as they reach military age they go into the fighting forces or the Army Service Corps. Meanwhile they are drilled and get a rudimentary idea of the military game. It keeps them fit. These boys are supplemented by thousands of French women who adapt themselves surprisingly well to the labour-saving machinery.

The new cans go straight from the factory to the filling-room, where women do all the work. From eight to ten thousand cans are filled every day. Railway tracks run straight into these annexes, and every day four solid trains of gasolene go up the line from each Depot. The standard railway freight car in France contains 1200 gallons of fuel, and each train averages 40 cars. Immense as this supply seems, it is just enough to keep the voracious engine of British Mechanical Transport tuned up and humming.

VI

THE MOTOR UNDER FIRE

WHEN you reach the Advanced Mechanical Transport Depot you are one step nearer to actual army operations. It is the link between Field and Base—the emergency clearing-house through which a stream of supplies flows steadily.

These Advanced Depots do a big business in spare parts. Each station keeps a month's supply of parts, tires, tools and accessories on hand. A simple and comprehensive system is in operation. As soon as a Demand for stores arrives, the items are written on a card which has a number. This number becomes the permanent record of the order through all the successive stages of filling, packing and shipping. Thus any detail of it can be easily traced. A so-called Issue and Receipt Voucher is issued in duplicate for every order. One of these is retained by the consignor, while the other is signed by the consignee at Railhead, who returns it as a receipt for goods delivered.

Every detail of work at an Advanced Mechanical Transport Depot contributes to the facility of operation. All supplies, for instance, are divided into two groups. One, marked A, includes equipment for British-made cars, while the other, marked B, is devoted to the needs of American makes. When the Demand comes in, it can immediately be stamped with one of these distinguishing letters.

One detail will show the efficiency of the Advanced

station system. At the close of each day's business every item that has been Demanded and packed that day must be accounted for. It must either be shipped, packed, or in the shipping bin ready to go up in the sectional Pack Train the following morning. If it is out of stock the Demand for it must be on the way to the Base Depot to be filled. In this way there is no "hang over" from day to day. The whole scheme of Mechanical Supply is based upon the idea that there must be no interference with traffic.

The issuance of parts and accessories, important as it is, constitutes but one phase of motor renewal. Every day trucks are smashed by shell fire, staff cars are disabled and motor-cycles wrecked. If repairable, the job must be done at once. To watch this operation you must come still farther afield to what is known as the Heavy Repair Shop. These shops are located in towns that skirt the zones of the armies. They must be immune from shell fire, although they are sometimes bombarded by aircraft. They are complete motor factories employing hundreds of men and women.

The Heavy Repair Shops are all fed, in the main, from the Casualty Park. Here you are bang up against the ravage that war wreaks. A Casualty Park is precisely what its name implies. It is the place where the wrecks of war are dumped, sorted out, sent on to be repaired or consigned to the junk heap.

Go to one of these Parks and in the heaped-up ruins of transport you get a vivid cross-section of war. If these mute and gaping wounds could speak, they would unfold a tale of sacrifice and death written in blood and agony on many an unsung field.

A shell-shattered truck visualizes the tragedy of a Divisional Supply Column that has ploughed through the night with its freight of food for the front and met disaster at a turn of the road. A riddled ambulance shows how an errand of succour was halted by the shrapnel that knows neither mercy nor charity. The twisted remnant of a motor-cycle is eloquent tribute

to the courage of a gallant dispatch rider who rushed to his doom on some hell-swept highway, while the mangled staff car proves that the men who direct the fighting are in the turmoil themselves. This mud-spattered and sanguinary mass of wreckage is a grim and ghastly gallery that pictures the heroism of the Army Service Corps.

In connection with these Casualty Parks is an interesting piece of war psychology. They are all screened from the highway so as to be invisible to the traffic that moves up and down. There is a definite reason for this. If an army chauffeur, going up to the front for the first time with a brand new truck, sees the horrible havoc that shells create, his enthusiasm is not likely to be fired, nor will his war spirit be increased. After seeing a lorry that has been put out of commission he is apt to say to himself, "What's the use of going up anyway?" It is precisely like the effect produced upon a man who goes into a hospital for an operation and is required to pass through the morgue on the way to his room.

At the Casualty Parks every piece of wreckage is carefully inspected with a view to repair or salvage. If it is absolutely beyond rehabilitation all the available metal is extracted, melted down and used again, while the accessories, like lamps, go to the salvage shop to be restored.

A repairable vehicle, no matter how badly battered, goes without delay to the Heavy Repair Shop, whence it emerges like new. These shops, like every other industrial institution allied to Supply and Transport, are marvels of organization. When a truck, or rather the remnants of a truck, reach the establishment, its history is written on a card just like the record of a patient is registered as soon as he enters a hospital. In fact the Heavy Repair Shop is the Hospital of Mechanical Transport. Every stage of vehicle reconstruction is noted, first in a Daily, and later in a Weekly, Record of Repair.

Through the medium of a friendly rivalry in output these shops are kept constantly speeded up. This is done by posting the records of the various shops where the men can see them. The results are very striking. When X shop learned one day last August that Y shop had overhauled and issued 67 trucks in one week it got an extra move on itself and turned out 81 the next week. The shops are manned by skilled mechanics. The foremen are usually non-commissioned officers, who had similar jobs in automobile factories in England, while the superintendents and heads of departments are motor manufacturers or engineers.

Closely associated with the largest Heavy Repair Shop in France is an institution which has tremendous meaning for the United States in her war preparation. I refer to the School for Officers. Here the aspirants for commissions in the Mechanical Transport Service get their training in a course of instruction that would do credit to the most thoroughly organized business university.

There is every detail of a technical college. The lecture-rooms are equipped with working models of every section of an automobile. You can see engines working and crank-shafts turning. In one hall is a complete and labelled collection of every part and accessory that belongs to a motor-car or a truck. Every class is limited to twenty men, which enables each member to ask all the questions he wants to ask and to be carefully cross-examined in turn.

Each applicant for a commission must pass an oral and written examination, and is also required to give a demonstration of his ability to run a car or truck under actual traffic conditions in the war zone. For one thing, he is required to operate a five-ton truck on the road at night with huge caterpillar tractors snorting all around him and making things highly uncomfortable for the driver. His gear is

tangled up by mechanical experts and he is made to straighten it out and repair it within a given time. Clad in overalls, he is put at a forge to learn exactly how castings are made. He must take a hand at assembling a car and do his bit in the engine-room. This is why the School of Instruction is located near a Heavy Repair Shop, where there are excellent facilities to study the making and the remaking of all types of Mechanical Transport from motor-cycles to Four-Wheel Drives.

The commissioned ranks of Mechanical Transport draw to a considerable extent upon men who have had to work with their hands all their lives. The moment they get commissions they are considered to be "Officers and Gentlemen." They must be prepared to meet the responsibilities of their new social station. Hence they are polished off with a course in etiquette and deportment.

Just as soon as a truck or car is completely overhauled it is sent to what is known as the Reserve Vehicle Park, which bears the same relation to France or the field anywhere that the Vehicle Pool does to England. In other words, it is the great Reserve Store that fills the gaps made by enemy shells, accidents, breakdowns or general wear and tear. It has two sources of supply—one the repaired vehicle from the Heavy Repair Shop, as you have already seen, and the other the new vehicle which comes to the Base Mechanical Transport Depot which receives all equipment as it arrives from England.

To see one of these Reserve Parks is to get an unforgettable impression of the scope of Mechanical Transport in the war. Not even the seemingly endless procession of supply and ammunition trains rattling along the roads gives you such an idea of the magnitude of the Army Transport world on tires. At one Park I saw 1400 vehicles, which included 1000 trucks and 300 open and closed cars. The rest were ambulances. They were all parked in long lines that made

a noble and really inspiring array, with each vehicle freshly painted, its brass gleaming like a mirror in the autumn sunlight. As I looked at those shining acres I realized that before many weeks elapsed the paint would cease to glisten, there would be dents in the engine armour, and more than one vehicle that now stood so proudly would be in splinters by the roadside or patients in the Repair Hospital.

There is practically no book-keeping at a Reserve Vehicle Park; nor is it necessary. When a car is received a record of it is made on a card, which becomes part of what is called a Live Index. At the same time it is chalked up on a huge blackboard. This blackboard enables the Commanding Officer of the Park to see at a glance just what stock he has on hand. When a Demand for Trucks or cars comes in he can fill it at once. Just as soon as the car goes out, the date of departure and destination are registered on its card, which is now transferred to another index called Demand Index.

Perhaps you are wondering about the human equipment of these cars. This is automatic, because, as I explained earlier, the moment a truck leaves England it carries with it a driver and an extra man. These two men stick to the car no matter where it goes. If a car is laid up at the Heavy Repair Shop they are required to make themselves useful about the factory. At the Vehicle Park they must do likewise. They are required to keep the cars in perfect order, so that the entire Reserve Supply can be moved on half an hour's notice. This means that every truck and car has its gasoline tank and extra tins filled, its tools in perfect order and every accessory intact. A turn of the crank is all that is needed to put it in commission.

I saw an extraordinary demonstration of the up-to-the-minute fitness of the vehicles at a certain Reserve Park. Fire, of course, is one of the great hazards, and every possible precaution is taken against

such disaster. For my benefit a fire drill was given one afternoon. The Commanding Officer asked me to indicate a vehicle that should be the basis for the alarm. I selected a three-ton truck in the middle of a line of sixty. These trucks faced one way, while backed up against them were sixty more trucks facing the other. In all directions extended lanes of every type of motor-car used in the army. I put a can in front of the truck indicated, and the officer rang the fire alarm without any previous warning to the men.

In less than three minutes after that bell sounded the truck in question was out on the roadside, and a sufficient gap had been made in the two lines of cars to prevent any spread of flames had it been impossible to remove the car that was supposed to be on fire. It would have been absolutely isolated. Every man at the Park had a definite thing to do, and he did it in record time. Forty of them immediately manned trucks and got them out of the hypothetical fire zone. Twenty others formed the crew of the motor fire-engine and water tank which accompanied it. Here was a fire department and portable water mains—a unique combination.

The moment a truck goes to a unit it is stamped with the device of the army to which it is attached. Each large fighting unit has its own hall-mark. It may be a grenade, a shamrock, a star or a crown. All ammunition trucks are marked with a large white shell, which identifies them at once. The French markings are much more frivolous than the British. You can see their huge *camions*—the French word for trucks—ornamented with pictures of barking dogs, crowing cocks or running hares.

All vehicles that break down in the field are not sent to the Heavy Repair Shop, which is only used for real casualties. Scores of trucks are only slightly damaged every day. For these the Shop reverses the usual procedure and literally goes to the relief of the disabled. This brings us to the whole system of

Mobile Repair Shops, which contribute the most thrilling chapter in the whole story of Mechanical Transport reconstruction.

You are now up in the zones of the armies where shells are flying, where the mechanics take their lives in their hands with the tools, and where trucks, cars and motor-cycles limp in from the battle areas, have their wounds dressed and go back on the job. They correspond with the so-called walking cases with the wounded.

Chief among these field patients are the gallant Divisional Supply Columns—the squadrons that get the food there no matter what lies in the path, and the no less gallant Ammunition Parks. These two units represent the Farthest North of the Army Mechanical Transport.

A Mobile Repair Shop is a miniature motor factory on wheels. It is usually built on a five-ton truck chassis, provides its own motor-power, and is thus enabled to go up and down the war area. Usually a Shop has a definite and fixed abode, but there is always an extra Shop that answers hurry-up calls. I mean by this that if a truck breaks down on the road or gets mired in a ditch the mountain comes to Mahomet. There are scores of minor defects and accidents, however, that do not require this procedure. The truck or car goes to the Repair Shop, which is often located in an open field. The conduct of these Shops demands courage and stamina. Like the Supply and Ammunition trains, they follow in the wake of the advancing armies. They are in truth First Aid to the Mechanically Injured.

The Mobile Shops do a great deal more than minor repairs on the spot. They extricate trucks that slip into shell holes; they re-tire vehicles and they deliver the derelicts to the Heavy Repair Shops. The nearest parallel to this whole institution that I can think of is the Flying Squadron of a Street Railway, which is a portable repair shop that goes racing up and down

the tracks binding up the wounds of traffic. The difference between the Street Railway Emergency car and the Mobile Shop is that one is not under fire and the other is exposed to nearly all the dangers incurred by the fighting armies.

You have now spanned the whole Mechanical Transport activity from factory to the front. You have seen how the motor vehicle brings up food, hauls ammunition, conveys soldiers, moves the wounded from field station to train or hospital, fills up Base and Advanced Supply Depots with stores and renews itself with clock-like and unfailing regularity. This machine must be maintained at all hazards, because a breakdown between Railhead and Refilling Point, for example, would work a very serious hardship with the men in the trenches, while an interruption between Railhead and Ammunition Dump might jeopardize the success of advance.

How, then, is the army vehicle kept fit so that, aside from the damage by enemy action and the natural hazards of congested traffic, it remains out of the repair shop and does its job? England expects every motor-truck to do its duty, and, thanks to a remarkable system of inspection, it does.

To see just how this system works you must retrace your steps to General Headquarters and go with me into the office of General Boyce, who is the originator and head of the whole scheme. It is epitomized on a big chart, covered with red, green, blue and black marks, that hangs on the wall opposite him. These marks indicate the exact physical condition of every transport unit in the field. Here is the way it works: the inspection of vehicles is by Divisions, each having its own Mechanical Transport organization, which bears the number of the Division to which it is attached. Just as soon as a Division Transport Unit is inspected the result is marked on the chart in colours. If it registers 100 per cent in efficiency and upkeep it gets a green mark; if the rating is 75 per cent the

record is blue ; if 50 per cent it is red. Any rating below 50 per cent literally gets a black mark. The Director of Transport, therefore, can sit at his desk and know from the colour scheme in front of him the physical state of the organization he controls.

So much for the results of inspection. Let us now watch the operation. Under General Boyce is a staff of thirty inspectors. Although they wear British uniforms and rank as lieutenants and captains, every one of them was an automobile expert before the war. Each inspector has a district. His job is to see that the Mechanical Transport in his bailiwick is thoroughly inspected every three months. This means that every car is overhauled four times a year.

These inspectors do not go about their jobs with a brass band. They show up at Mechanical Transport Unit Headquarters at all hours of the day or night. I went with one of these inspectors once on a very characteristic trip. We were travelling down a well-beaten road in the zone of a certain army when an empty three-ton truck came into view. My companion suddenly turned to me and said :

" I have a hunch that there is something the matter with that truck."

He had spent much time in America and had picked up some of our slang, as you observe.

When the truck came alongside he stopped it, told the chauffeur who he was and immediately proceeded to examine the vehicle. First of all he glanced at the driver's Log. In five minutes he discovered that the lubrication pipe was on the verge of becoming choked. If this had not been located the car would have broken down before it had gone much farther.

These inspectors have the right to hold up cars anywhere, and all military policemen and traffic officers (the highways of war are as adequately policed as Broadway in New York or State Street in Chicago) have special instructions to back them up in every possible way. An inspector, however, would never

hold up a loaded truck. If he sees that there is anything wrong with it he will order the driver to report to him after he delivers his load.

Watch one of these inspectors in action and you soon understand why the British Mechanical Transport is so efficient. When an Army Inspector inspects he inspects all over. He wears overalls and gets under the truck or car. From this point of first-hand observation he calls out his discoveries to a stenographer, who accompanies him on all his expeditions. Thus he overlooks nothing and has a record of everything. A specific report is made on every car inspected. It covers engine, front and back axle, transmission, body and equipment, and does not overlook the inevitable rope, chain and kit of digging tools that every army truck in the field is required to carry. Between snow and mud the truck chauffeur does almost as much digging as the soldiers in the trenches.

When an inspector overhauls a vehicle he usually takes a workshop officer with him who does the manual work. The Mechanical Transport inspection also includes the scrutiny of all steam transport used in the field. A limited number of steam-engines are employed to haul some of the heavy guns. With them boiler inspection is the most important detail.

One more significant feature of British Mechanical Transport remains to be explained. It answers the inevitable question which any survey of this tremendous and far-reaching technical activity would provoke. That question is: "How does the army keep track of more than fifty thousand vehicles that are being constantly shifted from place to place?"

The answer is to be found in a Registration System which begins as soon as a vehicle enters the service and continues until it is wiped off the Transport Map. Just as soon as a truck, for instance, arrives from England at a Base Mechanical Transport Depot in France its complete physical record is written on what

is called a Vehicle Registration Form. There is a separate sheet for each make of vehicle. It includes the War Department number, the chassis type and number, the engine type and number, the size of front and rear tires and the drive.

When a truck is assigned to a unit the narrative of its travels begins and a careful check is kept on its movements from that hour on. Every time it is transferred from one unit to another a report is sent to what is called the Census Branch, which is located in a little French town not many miles from General Headquarters, and which is the fountain-head of all information about the great Mechanical Transport Fleet in France. You can go into its office any day, ask for the location of a truck or car and find out in less than five minutes. More than this, you can get the complete biography of the vehicle from the time it entered the service.

That history is first summarized on an ordinary form card which is kept in a Live Index. As I write, I have before me a copy of a card on which is typed the Army Record of an American three-ton truck. At the top is its War Department number, the make and the type and number of chassis and engine. Below is a complete itemized list of every unit to which this car has been attached and the date of its service with it.

From this record you can see the different kind of work that an Army Truck is called upon to perform. This car's experience was no different from that of thousands of others scattered throughout Northern France.

The Card Index, however, only represents the first stage of Vehicle Intelligence. It is a sort of Information Outpost. All the data in it and much more is transferred to a large loose-leaf ledger, which constitutes the complete Motor Census of the Army Mechanical Transport. This book, which is being constantly revised, is an astonishing efficiency exhibit,

and would be worth its weight in gold to any motor manufacturer. It is indexed under makes, and these makes in turn are registered according to their consecutive chassis numbers.

Examine a leaf taken at random from the Census Ledger and you can see exactly how it works. The one that I shall use for illustration happens to deal with one of the best known English makes. On it is printed (not typed, mind you) the date that the cars or ambulances entered the service, the units to which they have been attached, the War Department and chassis numbers, engine types and numbers, the size of the tires and the original source of the car or truck. In the case of a purchased vehicle the factory name is given. Where the motor-car is a gift from private individual or organization the name of the donor is presented. It may be a duke or a private citizen. If a car or truck is returned to England or "scrapped," this information is set forth in a separate column. The Ledger is so devised as to leave plenty of blank space for coming events in the life of the vehicle. As these events happen they are printed on small slips of paper and pasted on the leaf. Thus the Census becomes a really notable industrial document.

Its value is as varied as it is great. Aside from being an absolutely infallible and up-to-date register of all Mechanical Transport in the army, it supplies the basis for the adequate provision of spare parts and accessories. It likewise enables the Financial Adviser to the War Office accurately to estimate Mechanical Transport expenditures and to write off all vehicles as soon as they are useless. Like the Vocabulary, it is a definite and permanent contribution to the uplift of the whole motor industry—one of the Compensations of War.

VII

THE SALVAGE OF BATTLE

WHATEVER designation the Great War may have in history no one will ever deny that, among other things, it is a War of Contrasts. It provides the amazing spectacle of German and Turk lying down together; of ancient foes like England and France lined up on a common battlefield of freedom; of American troops under arms marching through the streets of London; of Industry reborn and Society transformed. But no contrast—not even the flowering of thrift amid the ruins of colossal war expenditure—is so striking as the welding of Waste and Conservation. Of all the strange bedfellows of war these are the strangest.

From time immemorial War has spelled destruction. Yet out of the vast vortex which to-day engulfs men, money and materials is coming another tremendous lesson in economy that will make peace efficient and more orderly. The Salvage of War has been reduced to a precise science and is a definite and inseparable part of army operations in the field. The hand that destroys is the first to renew. Here you touch the least known of the many activities that go to make up the stupendous Business of War.

Again you get the example of a powerful War Machine that began with almost nothing. The first salvage was casual, and depended, in the main, upon the initiative or enterprise of individual officers. Now it is a full-fledged War Office Department with a complete

and far-reaching organization all its own and dedicated solely to rehabilitation. It saves the British Government millions of dollars every year, and points, at the same time, a moral that nothing else could so forcibly impress. It is another Cinderella of the Service—once rejected, even abused—that has developed into one of the permanent benefits of the huge conflict.

In former wars the human being was about the only thing regarded as redeemable. While there was life there was always the proverbial hope that the fighting man could be saved and possibly restored to some usefulness. As for arms, ammunition, equipment, food and stores of all kinds, the attitude was different. Why waste time on supplies that could be renewed? Everything spoiled or damaged went into the junk heap and was buried or burned. This is one reason why War became the synonym for Waste. To preach reclamation on any kind of scale was almost unsoldierly—it sank to the basely commercial although it invited the inevitable post-war inquiry scandal.

But that state of mind existed when war, as compared with present-day operations, was on a pigmy scale. With a host equal to half the entire population of the United States called to the colours in all the nations involved, and with an average daily outlay of \$160,000,000, Governments are inclined to try to snatch a few faggots from the titanic fires. The British efforts in this direction have created an Agency of Reconstruction that is a marvel of administration. The legend of the pig squeal, phonographed in Chicago's Packingtown, to prove that the Beef Barons waste nothing, has a real parallel in the economies now practised with army food alone.

During the first six months of the war—or even longer—there was terrific waste. In the circumstances this was a very natural procedure. With food and equipment the whole effort of the War Office was concentrated on one ambition—to fill stomachs, to clothe bodies and to arm hands. In the mad rush to stem

the German advance there was no time to think of economy.

You had only to go to any one of the Mobilization Depots in England when Kitchener's First Hundred Thousand was being raised to find out that the British Government was looked upon by both the civil and military population as the Lady Bountiful. When battalions moved away from Salisbury Plain or one of the other great training camps, nearly every house within a radius of fifteen miles was not only equipped with one or more army blankets, but army food and stores of all description. When scores of men went home on leave, their rations were drawn by the Quartermaster-Sergeants just the same. It went to the garbage heap or to the camp followers. When an economically disposed officer remonstrated with his men about the ungodly waste the invariable reply was :

"The Government is rich and can afford it. Why worry?"

Curiously enough, the first sense of saving manifested itself where there was the greatest destruction. This means that it began in France. It is not surprising also that it started with the Scotch, whose heroism under fire is only equalled by their thrift behind the lines. Instinct made the Highlander shy at the immense waste. He was not so keen as his English mate to discard a slightly soiled kilt or a damaged coat. His example was contagious, because, when all is said and done, thrift is a habit easily acquired.

Originally only guns and rifles were salvaged. The time-honoured method of disposing of the debris of battle was to assemble it in huge piles and set fire to them. They proved to be costly bonfires. Along in 1915 began the practice of segregating the wreckage of the battlefields and hauling it back to so-called "Dumps." The uniforms were taken out and sold for rags at \$250 a ton. Only the brass buttons were retained. Practically all the other refuse was destroyed.

One day the Quartermaster-General to all the Forces, Lieutenant-General Sir John Cowans, had an inspiration. He said to himself: "If these uniforms are worth \$250 a ton to the junkman they ought to be worth a good deal more to the army. Let us try to restore them."

As a result only actual rags went to the ragman and the nearly rags were sent to Paris to be restored. Out of this grew the great Paris Ordnance Depot, which to-day employs nearly four thousand women on salvage and saves the British Government in actual money more than \$12,000,000 a year.

Such was the beginning of British Army Salvage on any kind of organized scale. Long before 1915 had rounded out its twelve months of blood and disaster there was a Salvage Squad in every army unit. The work has grown steadily in scope and energy. To-day, almost before the flame and fury of battle subside, these squads are on the battleground, gathering up abandoned steel helmets, rifles, belts, haversacks, bayonets, shell cases, unexploded bombs and grenades, clothes, leggings, shoes—in fact, every scrap of stuff that can be transported.

All this equipment is thrown into motor-trucks or wagons and hauled behind the lines, where it is sorted out into individual items, loaded upon freight-cars and sent off to the various bases to be reclaimed there or sent on to England to be salvaged. Everything must be redeemed, or yield the British Government some return as junk or raw material. Only the dead remain where they fall. They alone are the unsalvaged.

Formerly all the shoes to be salvaged were shipped to a certain port in the north of France; the uniforms, blankets, kilts, underwear and rubber boots were overhauled in Paris, while most of the Ordnance went to England. As the litter of battle grew in volume it became necessary to increase the Salvage Depots, until there were three shoe-saving stations and half

a dozen Ordnance Reclamation Establishments in France and in England. A small army had to be recruited for this work.

With the development of the salvage idea naturally came a definite organization for its conduct. The physical end is under the immediate direction of Army Service Corps Officers who in civil life were engaged in some kind of business. The rank and file are enlisted men invalided out of active service or unfit for fighting by reason of physical disability or over-age. For two years each army in the field had a Salvage Head, while the entire work was supervised by the Quartermaster-General to all the Forces, who had a ranking representative at General Headquarters in France.

The scope of salvage reached such a point (its financial turnover represented many millions of dollars, while the number of articles retrieved grew to an almost incredible total) that it has developed into what the British Officer would call a separate "show"; that is, a complete and self-sustaining Branch of the Army.

You can see the whole Scheme of Salvage set forth on one of the huge charts similar to those that outline the strategy of Supply and Transport and their allied activities. Once more you have the helpful pyramid indicating every step of a vast business system.

The apex of the pyramid is the Salvage Board, composed of the Quartermaster-General, the Master-General of Ordnance, the Director-General of Military Aeronautics, the Director of Supply and Transport, the Director of Ordnance and Equipment Stores, the Surveyor-General of Supply, the Director of Military Movements and a representative of the Ministry of Munitions. The Voice and Interpreter of the Board is the Director of Salvage, Brigadier-General L. W. Atcherley. In the nature of his executive duties he corresponds to the Director of Supply and Transport, who is housed under the same roof. Under him are

five Deputy Directors of Salvage in England, each one in charge of a separate Department. Their opposite numbers in the field are called Controllers of Salvag . There is one with every army unit overseas, whether it be France, Salonika, Egypt, Africa or Mesopotamia. In other words, the sun never sets on the British Reclamation programme.

The first and most spectacular Department in the General Organization deals with Collection and Field Sorting. This is the unit that hovers on the fringe of battle and gets on the job before the smoke lifts from the hard-fought fields. Its function, therefore, is Battle Salvage. In order to understand the whole Reclamation process it might be well to explain here that there are two separate and distinct kinds of salvage. One is Battle Salvage, which deals with the debris of actual fighting and includes all trench materials such as wood and iron, shell-cases, guns, rifles, equipment, clothing, tools and other stores that have been damaged in actual fighting. The other is the so-called Normal Salvage, which is material such as empty packing-cases, gasoline cans and other articles which never reach the battlefield.

As you examine this Salvage System you find it reverses the procedure of Supply and Transport. With Food and Motor-Trucks, for example, you begin at the Point of Production and follow the commodity straight to the front, where it is destroyed or consumed. With Salvage, on the other hand, you begin with destruction or damage and retrace your steps to restoration.

All Advanced Salvage Depots (here again you find the parallel with the Supply and Transport Organization) have a double function. The undamaged equipment is cleaned on the spot and returned immediately to the Issue Stores. The damaged goods are sent back to the Base Depots for renewal. This comprises what might be called the Field Salvage Organization.

The next Department deals with Second Sorting.

A damaged belt or haversack easily repairable might be discarded as useless in the routine at the Advanced Base and thrown into the junk heap. In order to put a check on carelessness the stuff is submitted to a second inspection. If there is the slightest chance to save it, it goes to a Home Repair Shop located in England, where if classed as absolutely hopeless it lands among the "scrap" and is distributed by the Controller who deals with raw materials. You can see from the work of this Department that the Salvage Organization lets no possible piece of salvable material escape.

The work of the Third Section is concerned with Transport, Classification and Distribution of articles to be repaired and of the "scrap" metal and materials. It sees that all the goods to be salvaged land in England and are distributed to the proper factories and Depots. It is in constant communication with the War Office as to its needs and as to available ports, because all army shipping is constantly up against the eternal problem of tonnage.

Here, however, there is not the usual hectic scramble for cargo space, because the Quartermaster-General's ships which go over laden with food and ordnance stores are employed to bring the salvage material back to England. There are no empty hauls. The task, therefore, is to fit the returning ship to the port nearest the reclamation depot to be used. Here is the way it works: the Deputy Director of Salvage in charge of the Third Section is informed by wire from France, for example, that fifty 18-pounders are to be salvaged and await shipment. He immediately gets in touch with the Master-General of Ordnance, who naturally asks if they are worth repairing. If he is told that they are, he then consults the State of Work at Ordnance Depots. He may find that he can squeeze the guns into Woolwich Arsenal, and therefore instructs the Deputy Director of Salvage to have them shipped there.

The next phase in the organization is the all-important wing which deals with Statistics, Overhead Cost and Accounting. A complete set of books is kept on every group of items salvaged. It must yield a profit in renewal, or it is sold as junk, or employed as raw material. The word profit in connection with salvage has a more or less elastic definition. It may mean an actual money margin or its equivalent in time or labour saved in getting the article fresh from a factory.

When you reach the Fifth and final sub-pyramid in the Salvage Organization you are in contact with one of the most significant of all its ramified activities, for here you reach the Plans for Demobilization. You find outlined on paper the stages by which the enormous armament of war will be transferred to the uses of peace in the shortest and most efficient fashion. To look at only one angle, when the war ends England will find herself owning hundreds of thousands of cannon, large and small, and many millions of rifles. How to convert all this metal into ploughshares will be the great problem. Much of this procedure is secret, of course. For one thing, however, it is planned to utilize the returning armies to bring this immense mass of material home with them.

The reason is obvious. Just as soon as peace comes the average British Tommy is likely to throw away his gun and say to himself: "This war is over. The devil take the equipment. I am going to beat it back to 'Blighty.'"

The big meaning of this Demobilization Salvage plan is that salvage will not end with war. As a matter of fact it will just begin. It is a hint of that mighty Conservation of all resources which will make Great Britain a new world Industrial Power.

Having seen the outline of the Salvage System you can now go into the field and watch it at work. No branch of it is more imposing than the Paris Ordnance Depot. Here you get a very striking illustration of

the growth of Salvage as well as some idea of the immense financial profit that accrues to the British Government.

This Depot began as a "Dump" for mud and blood-spattered overcoats, riding breeches, blankets and kilts. To-day it reclaims millions of articles of wearing apparel and equipment every year, is organized like a huge business and saves John Bull a sum greater than the net profits of a full-fledged American Trust.

I went to this Depot one day last autumn. Before I passed through its carefully guarded gates the whirr of hundreds of sewing-machines smote my ear. The place literally hummed with industry. Freight cars were being shunted back and forth in the yards. Army trucks loaded with clothing rattled in and out. When the luncheon whistle blew thousands of women streamed forth to get their *déjeuner*. I could not help realizing that this completely equipped establishment, vibrating with energy, grew out of a pile of battle salvage and dealt with the by-products of war.

The Paris Depot—and it is typical in organization of all the other large salvage stations—is in charge of a once retired colonel, a "dug-out" as they are called, who has come back into the service like thousands of his comrades. Too old to fight, he is doing his bit amid the din and dust of the Waste of War. Having encountered the stench of more than one Reclamation Depot I can truthfully attest to the fact that it requires more courage, certainly a stronger staying power, to work there than to go "over the top."

All the articles to be salvaged are sent in special trains straight from the Base Depots behind the lines to the Paris Depot. There are two stages of sorting. The stuff is first dumped into huge open sheds, where a motley assortment of Frenchwomen do the overhauling. Practically all the labour is recruited from the immediate neighbourhood of the Depot. It in-

cludes the wives, sisters, mothers, grandmothers and sometimes great-grandmothers (for the Frenchwoman's labours only end with the grave) of soldiers. The scene in one of these great sorting-houses is as amusing as it is stuffy. You can see a wrinkled Frenchwoman with her head done up in a shawl and wearing the tunic of a sergeant in the Royal Medical Corps. The old lady is usually very proud of the Red Cross on her sleeve. Another ancient dame is swathed in the folds of an army overcoat, still spattered with the mud of Flanders, while the third may be seen attired in the closely buttoned-up coat of a member of the Royal Flying Corps, which she has exhumed from some foul-smelling heap of soiled uniforms.

These women throw the repairable articles into portable bins, which are trundled off to the cleaning-rooms, whence they go to the various Reclamation Divisions. As I have already intimated, the articles come straight from the battlefields and, like the wreckage in a Mechanical Transport Casualty Park, are eloquent if odorous evidence of the life-and-death struggle in which they have figured. Most tragic of all the exhibits are the tunics with the tell-tale and scorched bullet-holes through which the messengers of death have sped so unerringly.

Every article has a separate department in charge of a subordinate officer who has an adequate staff. The Paris Depot is unique in the fact that it is the one salvage place where every square inch of material that comes in is reclaimed or used in some way. The only thing not salvaged are the body vermin, which are slaughtered. I speak of vermin (no well-regulated Salvage Station is complete without them) because the Paris Depot specializes in kilts, which are the favourite stamping-ground for the little travellers. This is in no sense a commentary on the Scotch, who regard cleanliness as the next best thing to their proverbial godliness, but because the many folds in a kilt provide a safe and snug retreat for the pests.

Aside from the war on vermin—they are steamed out—the whole kilt renovation is a picturesque performance. Every Scotch regiment has its own particular tartan, which has some distinguishing stripe, check or colour arrangement. After the skirt is overhauled it is sorted out by plaids. The sergeant in charge—a battle-scarred veteran of the Argyll and Sutherland Highlanders—knows every one of the many Scotch tartans and piles them up by regiment as they come in.

To get down to practical facts, a new kilt costs on an average \$5.50. It is repaired, renewed, and sent back as good as new for exactly fifty cents. When a kilt is not redeemable it is cut up in pieces and used to line overcoats.

No feature of work at the Paris Depot is more animated than the reclamation of fur and sheepskin coats and leather jerkins worn by the motor transport chauffeurs. During the first winter of the war thousands of these sheepskin coats were used. They soiled so easily and became infected with so much vermin that the leather jerkin was substituted and has been found to be much more practical and sanitary. These coats and jerkins are placed in huge wooden drums, in which sawdust is thrown generously. The drums are rolled by machinery and the dirt and other impurities literally dashed out of the garments. It mixes with the sawdust and is removed with it. The sawdust is then used for fuel. Five thousand of these garments can be cleaned every day. The number of leather jerkins cleaned during six months last year was exactly 298,612, which represented a saving in money to the British Government of over \$500,000. Since the depot was established 700,000 jerkins and 300,000 sheepskin coats have been cleaned and restored. I might add that the renovated jerkin and fur-coat is much sought after by the British Tommy because it is softer and more wearable than a new garment.

Overcoats, or greatcoats as the British call them, are a big item at the Paris Depot. During the six months preceding my visit exactly 304,193 had been redeemed. If the Government had been compelled to buy these at first hand and at the Army Vocabulary or Catalogue price they would have cost \$2,375,000. These coats, turned back to the army at one-half this price, represented a net money saving, therefore, of over \$1,000,000, with all overhead cost deducted.

When an overcoat is beyond repair for a soldier it is stained grey or black and served out to the Chinese, East Indian or Egyptian Labour Battalions, or to the Prisoners of War.

At this Depot I saw a pile of German topcoats captured during a big advance and which were being salvaged. Eventually they will cover the backs of Hun prisoners, who will get the surprise of their lives when perhaps their own garments will be issued to them by their foes. Such is the irony of war!

The retrieving of clothes (the so-called service dress, which includes jackets, trousers and riding-breeches) opens up a fresh vista of well-organized salvage. All garments are divided into three classes. The first, which is designated A, is for garments of the first class—that is, uniforms that can be worn by soldiers in training or behind the lines. The second class, catalogued as B, includes garments not so desirable, which are to be used by men in the trenches, while the third class, C, comprises the work clothes for men engaged in building roads or in any one of the numerous manual labour jobs in field or camp.

The supervision of this work requires skill of a very high order. In charge of the whole job is a Scotch civilian who in civil life was head of a huge clothing establishment in London. Under him is a corps of trained French forewomen who classify the garments. With very deft fingers they stitch the class labels on the garments as they come by for inspection.

In this clothing department literally thousands of

needles fly every day. The women are paid by piece-work, and, being French and thereupon thrifty, they are in a constant contest with time. In order to speed each other up these models of industry work in friendly but highly profitable rivalry. The woman with the fattest time-check for the week is indeed the envy of all her co-workers.

The clothing output is in keeping with the production of the other departments. The average number of tunics or jackets overhauled during a six months' period has been approximately 202,000. If John Bull had bought these in the open market at the regulation Vocabulary price they would have cost him exactly \$729,000. By turning them over to the Government on a basis of half this price the saving is therefore \$364,500. With riding-breeches and trousers the saving is correspondingly large.

Another huge item of salvage relates to blankets of all kinds. During the six months ending last December 1,555,803 blankets of all kinds were salvaged. Originally they represented a cost to the army of \$3,889,505. Turned in to the Government on usual half-price schedule they showed a saving of \$1,944,252. Horse blankets at the rate of 160,000 every six months, and representing a saving of over \$300,000 during that period alone, are merely an incidental in the Blanket Department. Every year for the past two years the Paris Depot has salvaged an average of 20,000 pairs of gloves, 60,000 cardigans, 130,000 pairs of woollen drawers, 120,000 skirts, 41,000 towels and 200,000 woollen under-vests.

A complete "follow-up" system is in operation in every department. What is called a "Work-room Progress Return for the Week" is issued every Thursday morning. On this sheet you can see the number of garments dispatched, the wages paid and the exact cost per garment of every item salvaged. You find out, for instance, that the exact cost per garment of salvaging 140,000 pairs of pantaloons was 97

centimes, or about 20 cents. On the same sheet I observed that the cost per garment in wages of salvaging 8629 kilts was 297 centimes, or about 60 cents. So it went. The total of garments of all kinds handled was 805,312, while the average wages bill for each article was about 75 centimes, or only 15 cents.

Now take a final look at the books of the Paris Depot and you discover that after deducting all expenses, including civilian labour, cost of material, coal transport, rent, machinery, and wear and tear, the profits for six months ending December 31, 1916, were \$5,232,540. This average was more than sustained during 1917, when the total estimated saving for the year was about \$12,000,000. One unromantic but useful item on the income side of this Salvage Ledger is rags. Every six months this Depot sells not less than 500 tons at \$250 a ton.

Aside from this huge saving in actual money the reclamation at the Paris Ordnance Depot—before the Government established its Wool Control—had a very decided effect on keeping down the price of wool. If the British Government had been required to go into the open market and buy the millions of woollen garments represented by the number salvaged there would have been a very appreciable increase in the price of the raw material.

In Paris you can also see the Rubber Salvage Factory. This is run entirely on its own, that is, separate and distinct from the Ordnance Depot that I have just described. This plant has a peculiar significance, because rubber these days is almost as valuable as gold, and every ounce of it is carefully conserved. The chief items salvaged are thigh boots used in the trenches, capes, coats and ground-sheets upon which the soldiers sleep.

The usual story of economy is repeated here. A pair of rubber boots that at wholesale cost \$10 in London is redeemed here for 60 cents; a salvaged

cape that cost \$5.00 is turned out as good as new for 14 cents. You get a hint of the real saving effected in rubber when I tell you that before the Paris Rubber Factory was started the British Government got a bid from French Contractors to restore thigh boots at \$8.00 a pair! This was the lowest bid sent in.

Last year this Depot salvaged 450,000 rubber boots alone. It is in charge of a temporary officer who took a three months' course of instruction in one of the largest rubber factories in England and who later established a school of instruction for the hundreds of women employed.

After clothing, the item of personal wear that represents the largest amount of salvage is shoes. The British Government not only makes its shoes—since the outbreak of the war 24,500,000 pairs have been issued—but it has gone into sole-saving on a tremendous scale. The shoe salvage, which began very modestly at a northern French port, has grown to such an extent that the original plant now has a huge branch in the East of London.

Both of these plants have the same system of operation. The French establishment, however, has elements of distinct human interest. It employs more than a thousand French and Belgian girls, who sing as they work despite the ungodly smell that comes from the battered footgear, plastered as it is with the mud of road and trench, and sometimes filled with rotten straw or the old socks which the weary marcher has stuffed in to ease his aching feet.

All shoes in the army arrive at the Salvage Depots in sacks. When you see the contents dumped out you ask, "Is it humanly possible to repair this foul mass of tattered leather?" But it is—and in amazing fashion.

To begin with, the susceptibilities of the average Frenchwoman who works with her hands are not quite so sensitive as yours. She not only sees salva-

tion for a great many of the soiled shoes but a highly satisfactory rate of compensation for herself in the salvaging. These sorters have nimble fingers and keen eyes. In a second they decide what shoes are fit for service again and which ones—usually those with bad uppers—must be “scrapped.” If one shoe of a pair is unfit for further use, the other is salvaged, and, since the sizes are standardized, it is linked up with another odd one and the two go on their way of service.

Shoe reclamation, as you may well imagine, is not fragrant. But the Frenchwomen and their sisters in the London factory buck up to the job with great fortitude. It is all part of the day's work.

The shoes go through a systematic process of overhauling. One group of women cleans the rough mud from the outside, clear out all the foreign matter inside and plunge them into great tanks of hot water mixed with carbolic acid. Following this bath they are scrubbed thoroughly, after which they are dried out on racks and coated with warm castor-oil. They then pass to a group of Amazons chosen for their physical strength, who put the boots on iron lasts and tear off the old soles and heels. The shoes are now sorted out into sizes by pairs, enter the domain of another group who tack on temporarily the correct-sized sole before it is permanently nailed on by machine. The heel-tipping, toe-plating and hob-nailing—these army shoes must be like iron—are done by hand.

Every shoe salvaged is blocked for several hours so as to guarantee the exact size. After these blocks or lasts are removed the heels are inked, the size is stamped on the sole, the boot is again oiled and goes into the Store ready to be requisitioned. Like the leather jerkins salvaged in Paris, these repaired shoes are more popular with the soldiers than new ones for the simple reason that they are broken in for wear and never pinch the feet.

So much for the uppers that can stand new soles and heels. What becomes of the uppers that are frayed and torn? Once more Scotch thrift has come to the fore and saved the day. When the French shoe-salvage shop was first inaugurated all the damaged uppers were "scrapped." One day a young Aberdeen sergeant, wounded at Mons, and who was still standing by the colours by acting as foreman in the shoe shop, decided that these uppers should be saved. Almost on the spot he invented a machine which converts the unrepairable uppers into shoe strings. It is a circular knife operated at high speed. With great dexterity the French girls hold the upper in front of the knife and pull out the lace by the rear.

All told, more than a million pairs of shoes were salvaged in 1916, while the record for last year was considerably over this number. At the present high price of leather the saving runs into millions of dollars.

No detail of British Army Salvage is quite so striking in its human aspect as the retrieving of automobile spare parts. To observe this we will go back to the Empire of Mechanical Transport and establish ourselves at one of its largest Base Depots. Here, in an immense new concrete factory, which represents the last word in time and labour-saving construction, you will see one of the strangest sights of the war. It is nothing more or less than twelve hundred German prisoners, still clad in their fatigue uniforms, working at tool, lathe and bench and under the foremanship of British sergeant-majors who were skilled mechanics before the war.

The German prisoners represent the combing out of the many thousands of Huns now in British hands. When it was decided to salvage damaged automobile parts there arose at once that most persistent of all war questions—Where is the skilled labour to come from? Back in England every available and able-

bodied mechanic was geared up to munition-making or some other essential war industry. A long-headed subordinate under the Director of Transport solved the problem by suggesting that artisan German prisoners be used. Every batch contained at least a few competent workers. He argued that they could earn their board and lodging at a lathe much better and render a larger service to their keepers than by building roads or carrying sacks of oats at the Supply Depots.

The net result was that every Prisoner of War Company underwent a strict investigation. It was an easy task. These Companies are all in charge of their own non-commissioned officers, who, with characteristic German efficiency, keep complete records of their men and their pre-war occupations. These N.C.O.'s were asked to choose the most skilled of their colleagues.

When the factory was completed twelve hundred operatives were ready and more than willing to go to work. The big, warm, well-lighted and perfectly ventilated plant was like heaven after the cold roads, dirty ships and draughty warehouses in which many of them had toiled since their capture. These prisoners proved to be so capable and so industrious that the British Government now gives them a money allowance of three francs a day. This wage is paid in a special money printed for this purpose. It is legal tender at the Army Canteens, where the Boche prisoners can buy cigarettes, jam, beer and their dearly beloved sausage. Whether it is due to the extra money or the comfort in which they work, one thing is certain—the German prisoners on the salvage task have made good. Most of them are wise enough to realize that, following this unique experience, they will not only be alive but much more efficient when the war ends.

At this German-run Shop \$25,000 worth of spare parts are salvaged every week. When you consider

the immense need of automobile and truck spares, the great difficulty in securing them and the scarcity of steel, you can understand how essential this branch of reclamation becomes.

There are three alternatives in Mechanical Transport retrieving. The first is to repair the article as, for example, a magneto, and restore it to its original form. The second is to melt down the metal and use it for raw material. The third is to "scrap" it. All "scrap" from the Mechanical Transport goes to the Ministry of Munitions. These same rules apply to the salvaging of aeroplane engine parts.

More than 3000 separate motor vehicle parts are repaired and issued for immediate use each week. They include complete engines, radiators, ball bearings, axles and wheels, accessories and fittings like lamps, batteries, wind screens, magnetos, inner tubes, spark plugs and speedometers. Altogether 50,000 spark plugs and 2000 magnetos have been reclaimed since the work began. The total value of all the salvaged parts is more than \$2,500,000.

When a part is beyond repair the material of which it is composed is frequently used for the reproduction of that "spare" or for the repair of some other. Destroyed radiators are melted down to make new ones; burnt-out truck valves are machined into car valves; worn brass bushes are recast and made into new ones. About fifteen hundred such parts are made and remade every week. Absolutely nothing is permitted to go to waste. Even the soldier baths used in the repair work come from the scrap heap.

Like nearly every other important war activity, the Reclamation of Automobile spare parts is doing its bit in the permanent uplift of Industry. Its prize contribution is a new system of renewing iron or steel parts. For the want of something better, this process is called Electric Steel Deposition. Any metal part that needs building up can be restored to its original form by this

ingenious device, which applies the new skin electrically. It is really a bath, resembles electro-plating in operation and was invented by one of the temporary officers stationed at the factory.

The next chapter in the story of War Salvage takes us across the Channel to an ancient Citadel of British Ordnance, long the centre of treasured military traditions. Here you see an entirely different class of work.

It deals, for one thing, with web and canvas equipment. This includes packs, haversacks and cartridge belts. Originally all these articles were made of leather, but as the demands of war grew at such tremendous pace the web stuff was substituted for the hide, and is proving to be just as efficient and much more easily salvaged.

At this arsenal John Bull's War Laundry goes at full swing. All the web and canvas equipment is washed in huge tubs and darned with machinery. It is restored to the men as good as new.

But it is with leather equipment that the real miracle is wrought. Hundreds of saddles come in from the front every week. Many of them are shot full of holes, and nearly all have the mud of the French roads still clinging to them. A new officer's saddle represents an outlay of from \$50 to \$100. In this process of salvage it can be remade for several dollars.

So, too, with the leather trench-tool carriers, which represent a very considerable item of expense. This procedure discloses one of the many illustrations of war utility. In the old days before this war, when no one thought of husbanding raw material, the British troops that went to India and Egypt used huge leather bags to contain the spare bedding. They represented acres of hides. All these now unnecessary bags have been called in and converted into containers for trench tools.

One significant adjunct of the leather restoration

is a School for Saddlers, which is operated in connection with the salvage work. Here the men are trained to do repair work in the field. They get a complete course of instruction under experienced saddlers. In the workshop you see dummy horses equipped with every kind of leather kit used in the army. Every man must serve his time in the leather salvage department, which gives him practical experience. When he goes to France or one of the other theatres of war he can tackle any sort of leather repair job.

No evidence of the completeness of the army thrift crusade is more striking than the treatment of carcass cloths. It deals with the large pieces of white linen used to cover the carcasses of beef that come from South America, the United States and Australia. In ordinary times and in ordinary wars these blood-stained sheets would have been thrown away as worthless. To-day you see them literally cooked down in large vats. Their long contact with the beef on the voyage has impregnated them with considerable fat. In the boiling process this grease comes to the surface, is skimmed off and used for what is called "dubbing," an excellent leather softener. The rags themselves are cut into small pieces and employed for general cleaning purposes. This operation represents salvage raised to the *n*th degree. It is like splitting hairs.

No less drastic is the treatment to which the empty flour sacks at Army Bakeries are subjected. Flour always clings to its cloth receptacle and it is worth reclaiming. The bags, therefore, are dropped into a hopper, which revolves at great speed and extracts every particle of flour from the goods. The sacks are used for various purposes and the flour goes into army bread. At one bakery in France the saving in flour which would otherwise have been lost in the sack is not less than \$250 a week.

While we are on the subject of flour I am reminded

of still another unusual piece of salvage. Nearly all the ovens at one of the largest Base Bakeries in France, in which hundreds of thousands of loaves of bread are baked every day, are merely reclaimed Travelling Ovens which were originally part of the commissary equipment of troops in the field. On account of the rough usage they usually show signs of deterioration in the outer casing after six months of hard service. With this decay comes a decrease in bread output because less heat is retained. This proved to be a serious handicap in the feeding of troops. It was almost impossible to make adequate repairs, and scores of the ovens had to be "scrapped." Since each one cost from \$950 to \$1000 the loss to the Public Purse was very great.

A bright young man in the Army Service Corps—once more the ever-ready and useful temporary officer—suggested that these Travelling Ovens could be bricked in and made into ground ovens. Two ovens were accordingly installed in this way, and they proved to be so successful that within six months practically every oven at the Depot I am describing was built out of abandoned field property.

In the field the travelling oven burns wood. This proved to be a very expensive item for the bakeries. Coke was substituted, with the result that a great saving in fuel cost was effected. As a matter of exact fact the saving at this one bakery amounts to \$12,000 every month and this includes the cost of transporting the fuel. More than this not a single travelling oven has been "scrapped" since the scheme was inaugurated. To cap the climax of conservation at this bakery I have only to add that it is built on reclaimed ground.

The system of salvage extends everywhere. Nothing is immune. Every gasoline can is used and re-used until it is dilapidated and then the tin is sold. The wooden packing-cases are employed until they fall to pieces and the scraps become kindling; hospital

dressings are sterilized and sold as cotton waste ; small motor parts are sent up to the front in empty cigarette and tobacco tins set aside for the purpose ; damaged gas helmets are washed in warm water so that the chemicals used in them may be retrieved. The British soldier is taught that true economy, like the wealth that accumulates from pennies, is merely the sum of small things.

The same minute conservation applies to battle salvage. Wherever you go in the zones of the armies you are likely to see unexploded shells, or "duds" as the army calls them. Before economy got its grip on the fighting hosts very little attention was paid to them. They were allowed to remain in the fields where they dropped. Up near a battered village that had recently been captured I saw this sign in the midst of the ruins :

"SAVE SHELLS.

THEY ARE FOR FRITZ, NOT FOR WASTE."

In a French town taken by the British Forces last summer and which had been under severe bombardment for a long time, these signs are posted everywhere :

"PICK UP A NAIL

AND SAVE A HORSE."

Under these signs are empty biscuit-boxes into which the men throw the nails that litter the streets. One reason for this injunction, aside from the fact that it saves actual nails, is that it prevents many an army horse from getting them in his hoofs and going lame.

The salvage of wood—and more especially the timber taken out of captured or abandoned German trenches—is carried on on a very large scale. Each army has a miniature sawmill as part of its equipment.

One British Army supplied all its wood needs for six months out of the supports and walls obtained from German positions. This did not include the thousands of poplar trees which had once lined the roadsides and which had been slaughtered by the retreating Huns with characteristic wantonness.

VIII

THE ARMY FOOD DRIVE

THIS panorama of reconstruction, ranging from redeemed biscuit-cans to restored nine-inch howitzers, is merely the approach to the most significant of British salvage processes. For now we come to Food Economy, to the conservation of the one commodity which more than any other, and not even excepting guns and ammunition, will help to turn the tide of conflict. At a time when the food question is looming large as a crucial war factor this work is of supreme interest to the whole American people.

The greatest army waste was with food and, by the same token, food is now the basis of the most remarkable of all salvage activities. It furnishes the lesson in thrift that reaches from the domain of battling armies straight into every man's home. It is the Universal Theme.

When John Jones, the average citizen anywhere, growls about the high cost of living and contemplates the hole that kitchen extravagance makes in his income, he thinks that he is a much-abused person. He is struggling with a problem that only affects his own household—at most a comparatively few people. Consider then the proposition that confronted the British Government, with thousands of kitchens and millions of men to feed, and you realize the enormous dent that waste in cooking and eating made in the national pocket-book.

His job was to keep his new and growing armies fed regardless of consumption. But when the great machine of Supply struck its stride and the armies were shaken down, one of the first things that bobbed up for investigation and possible supervision was the question of food outlay. Already the menace of famine brooded over the horizon. The submarine danger was growing each day ; food ships were going down every week ; England was in the grip of a Food Controller. The conservation of what men and women ate became a matter of vital necessity.

Of course, food restriction had to begin with the civilian. The last person where it could possibly be enforced was with the fighting man. Yet no one realized more than the Army Chiefs themselves that the wastage among the troops was little less than criminal. Something had to be done.

It followed, therefore, that along in the summer of 1916 a definite movement was inaugurated to conserve and control army food consumption, but most of all to put a check on the hideous waste that was sacrificing untold tons of supplies every year. A new wing of the Quartermaster-General's Department was set up and dedicated to the supervision, maintenance and auditing of all Mess Services at home and abroad. It was technically called the Quartermaster-General's Inspection Service.

Before this new department had been in operation twelve months it had not only brought about drastic reforms that saved millions of dollars, but had stimulated industry, stiffened British independence in one very essential branch of munitions making and established a full-fledged and highly profitable business.

Since the kitchen was the root of the food wastage evil it became the goal of a great offensive. First of all the army cooks were put under the microscope and carefully analysed. Up to this time most of them had been drafted from civil life. The majority were incompetent. They looked upon Government food

as something devised for waste. In this idea they were aided and abetted by the soldiers themselves, who frequently threw away more of their rations than they ate. This grand carnival of extravagance at Government expense was doomed to a speedy finish.

"If we are going to censor the kitchen we must begin with the cook," said the new Watch-Dogs of the Messes.

The only way to get efficient cooks was to train them, so Schools of Cookery were started in England and Scotland. They are in charge of temporary officers, all experienced caterers in civil life, who are called Instructors in Catering. These schools proved to be so successful in the United Kingdom that scores were established along the Lines of Communication in France at every large Infantry Base Depot.

The course of instruction lasts for four weeks. For fourteen days the candidate attends daily lectures on every phase of cooking, from cutting up the sides of beef and the reception of uncooked material generally to the preparation of a complete meal. He is given a course of talks on diet; he is taught to build improvised ovens out of empty biscuit-tins or scrap sheets of iron in case he is with a unit that loses its baggage train on the march; he is shown how to eliminate waste in every phase of kitchen work.

After two weeks he is put on the job of cooking food for the men at the depot to which his school is attached. At the end of his period of instruction he is required to pass an examination. If he meets all requirements he is given a small card which certifies that he has completed the course in the School of Cookery and it becomes his passport into the zone of full-fledged Army Cooks. Since the establishment of these schools 42,250 graduate cooks have been turned out. They are the Minute Men of Army Food Economy.

The thoroughness of the cookery course is evidenced by many illuminating documents. Typical of these is a *Manual of Military Cooking and Dietary* which is

the Cook-Book of the army. The rawest cook in the world could produce something eatable by simply following its instructions. It shows how every article of food used in the army can be used to the best advantage and made to do the utmost work in case of a breakdown in food transport. Since troops in the field are sometimes called upon to impress or buy cattle for their sustenance, there is a chapter on the killing, skinning and preparation of the carcass. This section even goes to the extent of reproducing pictures of cattle, sheep and pigs, showing their various edible parts in cross-section. Even with the Cook-Book the British Army instruction omits no detail.

There is a series of books dealing with the construction of Army Ovens. The cook is not only taught how to improvise ovens out of scraps, but to keep his kitchen tools in good repair.

A complete words-of-one-syllable culinary literature has been prepared for the Army Cook. One of these books is called *The Cookhouse and Simple Recipes*. It is packed with helpful hints on how to keep the Cookhouse sanitary; how to build fires; how to cut up bread, cheese and cake with the least possible waste; how to make the most of every ration (that is, make sausages, rissoles and other combinations out of leavings); and how to manufacture improvised bread-slicers and potato-peelers. It is really a full course in Domestic Science.

One important feature of the book deals with the soldiers' diet sheet. Under the new Army Food Regulations every Master Cook is required to make out a Weekly Diet Sheet which announces the complete menu for the men. It is posted conspicuously in the Cookhouse and Mess-Rooms every Sunday morning. Its chief advantages are that the cooks know what to prepare from day to day, while the men know what they are going to have. It facilitates the ration indent, tends toward economy and helps to ensure a variety of food.

The Instructors in Catering are very important Army individuals. A Flying Squadron is constantly on the go, making unexpected inspections of Cook-houses. In their operations they are akin to the Inspectors in the Mechanical Transport, and, like them, are the terrors of the slacker and the sloven.

The results of every inspection are reported on a form which is specially prepared for this purpose. It records the name of the unit, its station, its average daily feeding strength, how the food is stored, whether the Master Cook is trained or needs training, and finally if a so-called stock-pot is in use. The stock-pot is a very important first aid to army food saving. It is usually a huge kettle in which all surplus and eatable meat and bones are dumped, and which becomes the sanctuary of the justly famous army stew.

This constant supervision of cooking has not only reduced waste but enabled the British Army to curtail its rations considerably during 1917. Two ounces a day have been pinched off the allowance of bread stuffs except in the cases of soldiers under nineteen, who have the prize appetites of the Service. The salt ration has been cut down by one-fourth of an ounce per man a day, and a considerable saving has been effected in the consumption of tea. All these items represent a saving in actual cash of approximately \$20,000,000 a year, and the economies in this direction have just begun.

Although this whip-hand over waste reduced the ration and eliminated extravagance in the preparation of food there was still an enormous sacrifice in the kitchen. Every day in the hundreds of army cook-houses at home and abroad the leavings from plate, dining-table, pot and skillet were dumped indiscriminately into the garbage heap. These by-products of the army ration represented, in the course of a year, thousands of tons of bone and fat which had a perfectly good and profitable commercial use. So the Quartermaster-General's Department bestirred itself to utilize

all this waste, with the result that it has built up a huge industry that conveys one of the most useful lessons of the war.

Two definite causes contributed to this really remarkable conversion of refuse into money. The first was the daily reminder in the shape of garbage that had to be burned. The second and more important dealt with that mainstay of all army advance—Munitions. As long ago as 1915 England realized that she was paying an excessive price for glycerine, which is one of the essentials in the making of high explosives. The soap-makers in the United Kingdom notified the Government that owing to the abnormal price for glycerine—it was \$1250 a ton, against the pre-war price of \$250 a ton—the American soap-makers were in a position to sell their product abroad at a price with which the British manufacturers could not compete.

In order to understand the connection between soap-making and glycerine (from which nitro-glycerine is made) you must first know that animal fat produces soap. One of the by-products of soap-making, in turn, is the much needed and now highly prized glycerine. One hundred pounds of fat produces ten pounds of glycerine. Before the war and when there was only a normal demand for high explosives, glycerine had to be content to occupy a place in the industrial catalogue as a mere by-product. Since the war the tail wags the dog, and glycerine is as rare and almost as precious as gold. Now you can see why the American soap-maker could afford to sell his product for a song in the United Kingdom.

No wonder the British soap-makers were up in arms. They made it very clear to their Government that, if the state of affairs that I have just described continued, the manufacture of soap at home would have to stop and the Government would be entirely dependent upon the American market for its supply of glycerine and at an excessive price.

The British Government at once got busy. It

prohibited the importation of soap from the United States, and decided to collect all the fat from the army camps and use it for the double purpose of producing British-made soap and British glycerine for British shells. Here you have one of the many side-lights on that growing self-sufficiency of the Empire which will be a tremendous weapon when the war is over.

An agreement was entered into between the Army, the Government and the soap-makers. The Army agreed to turn over all the by-products of camp and kitchen to the soap-makers, and the soap-makers, on their part, undertook to supply the Ministry of Munitions with all the glycerine extracted from the fat at the pre-war price of \$250 a ton. The scale of prices for all refuse would depend upon the market variations and would be fixed each month by a group of manufacturers known as the Committee for the Purchase of Army Camp Refuse. This Committee is headed by Mr. John W. Hope, one of the soap kings of England and a business man of wide and practical experience.

Now began the great mobilization of waste products. It was easier said than done. Here was the problem. In thousands of camps the grease and bones were dumped out every day. Obviously all this litter could not be conveyed to England. It had to be reduced to fat on the spot.

Once more a difficult technical proposition was put up to the Army, who met the emergency with customary resource and ingenuity. A chemist in the Royal Army Medical Corps, Captain Ellis by name, who was an Assistant Inspector of Catering and who had been an expert chemical adviser before the war, invented an apparatus known as the Ellis Field Fat-Extracting Plant. In this process the rough fat and bones collected from the camps are treated in boiling tanks through which superheated steam is passed. The fat is run out, put into barrels or kegs and dispatched to England to the Committee for the Purchase of

Army Camp Refuse. Altogether eight of these plants are in operation in France alone. There are half a dozen more in England. They are usually attached to an important Infantry Base where cooking is conducted on a very large scale.

These Fat Plants are the wholesale establishments. In order to round up every available scrap of refuse all units in the field, no matter how small, become sources of supply and represent the retail end. There units render the suet skimmings or refuse down to what is called dripping, which is sent to Collecting Depots in old biscuit and tea tins. These Collecting Depots are at smaller Bases, where the erection of a plant is not justified. If the dripping is properly rendered down it is dispatched at once to England. If not it is sent on to a Field Extracting Plant for further treatment.

There is a complete system of accounting. The collection of fat from the armies in the field is organized as follows. The rendered dripping is handed in to officers at Railheads, who give a receipt for the weight received. Attached to this receipt is a voucher for the cash due to the unit. This voucher is legal tender at any army canteen. The money is used by the men to buy additional luxuries such as fresh vegetables or fruit. Often the proceeds of their kitchen economy are devoted to the purchase of utensils to improve the Mess arrangements of the unit, such as extra dishes, cruets and bacon-cutters.

When dripping is sent direct to the Fat-Extracting Plant an account is opened for each unit and it is credited with every instalment which it sends in. Here, as in the field, vouchers are attached to every receipt and they can be handed in at the canteens as payment for supplies.

I visited one of these Field Fat-Extracting Plants Somewhere in France. It was located near an important Supply Depot where thousands of men were camped. It proclaimed its presence long before I

reached it. It was like approaching Packingtown in Chicago when the wind was in the wrong direction. In charge was a young lieutenant who before this war had encountered nothing stronger in the way of odours than the breeze from the Thames. Now he laboured in the midst of a frightful stench. He had been wounded twice, as his two sleeve stripes showed, and might have had a soft desk job at home. But he was willing to stick it out on a task that he frankly admitted was much more trying than fighting Germans.

The plant was as busy as it was smelly. Every now and then a big army motor-truck would rattle up with a load of garbage. Special containers are used which bear the number of their army unit. Off to one side was a swill warehouse. All the leavings of the rendering plant, together with accumulated potato peelings, are sold to the French farmers for hog food at fifty cents a barrel. The business at this particular place was so extensive that a book-keeper was constantly employed to keep track of its affairs.

The conversion of actual meat refuse into fat for soap-making is only one phase of the utilization of waste products. Bones compete with drippings in salvage importance. After all the fat is boiled out of the bones—one hundred pounds of bone produce ten pounds of fat—the remains are used for the manufacture of tooth and nail brushes, while the small pieces are crushed and sold for fertilizer.

Even the scraps from the soldiers' plates are utilized. When you go to an Army Mess Hall you will observe that every soldier files out plate in hand. Outside the door he stops at a tub and scrapes all the leavings on the dish into it. These leavings are dried and chopped up for chicken food. Bread crumbs are treated the same way.

The system which assembles Army Refuse is as complete as scientific business methods can devise. In every Army Cookhouse hangs a comprehensive chart issued by the Committee for the Purchase of

Army Camp Refuse, which shows how recoveries of fat are made. From this chart the cook can see how to cut off suet, trimmings and so-called "butcher's fat" from the raw material; how to get cracklings, skimmings and all scraps from the processes of cooking; how to retrieve sausage skins, bacon rind, the marrow from bone after the food is served—in fact, how to utilize every possible square inch of food that passes through his hands. This economy has almost become a vice, because an Army Order had to be issued last September requesting cooks not to pare down their trimmings for glycerine fat too close. The actual food supply was sometimes impaired through over-zeal. This resulted from competition between units to secure high figures in the monthly by-products return.

The cost of setting up and operating the Fat-Extracting Plants is obtained from a Central Fund created by retaining a small difference between the price obtained for the fat from the Committee for the Purchase of Army Camp Refuse and the price paid the Units for the waste material. This fund is administered by the Inspection Department of the Quartermaster-General's Service. Out of it is paid the cost of erection of factories, labour and the maintenance of the various Collecting Depots.

I can give you no better idea of the results of these salvage operations than to say that last year enough glycerine was obtained from army fat to provide the propellant for 18,000,000 eighteen-pound shells. This means that approximately 1800 tons of glycerine were obtained from the refuse of the camp kitchens. This glycerine, sold to the Ministry of Munitions at the pre-war price of \$250 a ton, meant a net saving of \$1000 a ton, or exactly \$1,800,000. In addition to this the soldier got the benefit of many luxuries, which made him much more contented and therefore more efficient.

The gross income from the sale of by-products alone last year was \$3,940,000. Add to this the saving in the cost of glycerine and the value of the reduction

in rations brought about by the supervision of cooking and other economies and you get a total saving estimated to be not less than \$30,000,000. A larger phase of this conservation lies in the fact that it enabled a considerable amount of food to be released to the general public. At the same time, the army and navy got all its soap free of charge, which is part of the contract with the Committee for the Purchase of Army Refuse. At Salonika the British Army not only renders all its fat, but conducts its own soap factory.

So successful and widespread is the army refuse business that a company had to be formed to run it. It is under the jurisdiction of the Army Council, and is called the Army Waste Products Company Ltd. It is organized and operated just like any British Corporation. The Quartermaster-General to all the Forces, Lieutenant-General Sir John Cowans, is President, while Major-General F. W. B. Landon, Chief Inspector of the Quartermaster-General's Services, is Vice-President and General Manager. Although the capital is only seven shillings—about \$1.75—it does a business in all its branches of many millions of dollars a year. It could pay dividends that would compare favourably with some of the “melons” cut by successful American concerns.

More important perhaps than these imposing profits is the permanent lesson to every man who touches the salvage system. He realizes an asset that will be a bulwark for his future. He will go back to peace not only richer in experience but more frugal in habit. The army cook, for instance, disciplined in economy with Government property, will instinctively husband his own. It will establish the precedent for his whole family.

This contact with conservation is full brother to that other and equally constructive preachment embodied in the lesson of the War Savings Certificate, which has taught the Briton to think in terms of

thrift and which is now happily becoming a part of American economic life.

The whole British Army Salvage Scheme emphasizes the need of a Junk and Refuse Dictator in the United States, for a control of Salvage would save it untold millions and help to shorten the war. It also points the world a way to a retrenchment in money and materials that is in many respects the most valuable dividend yet declared by the Business of War.

War is not all Waste.

IX

THE WARES OF WAR

WHEREVER you journey in the zones of the armies you cannot fail to be impressed with the almost ceaseless movement of ammunition trains. Day and night the lorries and wagons rumble up and down the beaten highways, hauling the deadly freight which is as precious and priceless as food. Turn from the road and your eye lights upon the familiar white and blue flag which indicates the presence of the ammunition "dump."

After the Commissariat the question of shell supply is the most important in the war. Preponderance of munition resource gave Germany her first great advantage in the conflict. It took Great Britain more than a year to catch up.

Ammunition provides one of the stupendous items of war expenditure both in material and money. This is a war of ammunition. In the first battle of the Somme, for example, more shells were expended in a week than were used in the whole Boer War. The appetites of the iron mouths are never appeased.

The average visitor to the war regards the provision of shells and guns as a matter of course. But, like Supply and Transport, it is a perfectly organized, well-oiled and admirably conducted annexe of the Business of War—just another cog in a marvellous machine.

With this phase of operation you leave the Domain

of the Quartermaster-General and enter the Bailiwick of the Master-General of Ordnance, whose task is to provide arms of all descriptions, guns and gun carriages, ammunition, vehicles which are mainly mechanical transport, and telephone and telegraph stores. The principal items, however, are guns and ammunition. Instead of looking to the Surveyor-General of Supply to stock his grim shelves, as is the case with food and general equipment, he is allied with the Minister of Munitions, who is the Master Merchandiser of the Wares of War.

Again you have the spectacle of a titanic agency of supply. It is as far-flung as the war itself. It ranges from the factories of the United States and Canada to the controlled establishments of England and Scotland where millions of men and women, recruited from all ranks, labour day and night in the eternal effort to feed the hungry maws of gun, trench mortar and rifle. As Britain's home sources of shell supply have grown she has become less dependent upon her overseas Allies. The Ministry of Munitions to-day is almost self-sufficient.

No evidence of England's war expansion is more eloquent or illuminating than the rise of this stupendous engine of destruction. From a small room in Whitehall in London where a few devoted engineers, ship-builders, chemists and inventors rallied around Lloyd George in 1915, it has grown into a vast business which operates directly or indirectly more than four thousand factories, and employs in its inspection work alone an army almost equal to the entire First Seven Divisions—England's regular Army—which rushed to the relief of Belgium. It has been the largest contributing factor to England's industrial development; it has enriched science, stimulated research; it will be Britain's mechanical bulwark when the war is over and the bloodless trade conflicts of peace begin.

With ammunition, as with every other detail, this war has smashed all precedents and established

amazing standards of scope and output. In the Boer War the 4.7 gun was the heaviest employed ; in this war the armies in the field use 12- and 15-inch howitzers that weigh, with their carriages, more than two hundred tons. In the Boer War 500 rounds of ammunition was considered a large supply for a gun ; to-day no gun would regard itself well supplied with less than 5000. Now you can get some idea of the demands made upon shell factories.

You get a further conception of ammunition needs when I go on to say that leaving out rifle and revolver cartridges, which must be supplied by the hundreds of millions, the Ministry of Munitions is called upon to produce shells for twelve different calibres of cannon, ranging from the 3-inch anti-craft guns—the “Archies”—to 15-inch howitzers. Not only must these guns be fed incessantly, but an immense reserve is absolutely necessary in every theatre of war. This means that the “M.G.O.”—as the Master-General of Ordnance is called—is required to have his own fleet of ammunition ships whose crews are carefully trained in the handling of high explosives. In some of the compartments of these ships the workers wear felt slippers in order to minimize the danger of explosion.

In any study of shell supply the first and most natural question is : How does the Ministry of Munitions know what and how much to make ? With food this task is comparatively easy. The Quarter-master-General is told how many men must be fed everywhere, and since there is a definite ration it becomes a simple matter of mathematics.

With ammunition the operation is almost identical. Here, as with Supply, the organization is carefully charted and diagrammed. At the War Office, in addition to the Master-General of Ordnance, is a Director of Artillery, who is the link between Supply and Demand. He has an opposite number in the field known as the Director of Ordnance Services, who is

established at General Headquarters in France or at the headquarters of the other overseas armies.

The Director of Ordnance Services is the apex of a pyramid which extends to every army in the field. His voice and interpreter is a Deputy Director of Ordnance Services, who, in turn, is represented by Assistant Deputies of Ordnance Services. Carrying the service straight into the zones of the fighting armies you find that with each Division there is a Deputy Assistant Director of Ordnance Services, or "Dados" as he is commonly known. He corresponds to the Senior Supply Officer who makes the food demands for a Division.

The Director of Artillery at the War Office is in constant touch by telephone and telegraph with the Director of Ordnance Services at G.H.Q. He knows how many guns are in commission, and just what they need. Each gun, big or little, can only be fired a certain number of times during every twenty-four hours. Provision therefore is made according to these needs. In the case of a big push, which is always inaugurated with an immense bombardment, advance orders are sent in from the field: the munition factories are speeded up and tremendous reserves are accumulated. When the iron dogs are unleashed they can bark with unrestrained fury.

It was not always so. During that first terrible twelve months of war when German preparedness took its frightful toll in Belgium and Flanders the British guns were well-nigh impotent. Shells had to be husbanded just as sugar was hoarded a few years later. But all that was part of the unhappy task. Thanks to the patriotism of British labour, and particularly to that million of women workers, England to-day has a surplus of ammunition, some of which has been generously placed at the disposal of her Allies, including the United States.

To visualize this colossal business of shell supply let me take you for a brief visit to the greatest of British

arsenals—oldest in point of service, and whose personnel alone affords some idea of the expansion in munitions labour. In August 1914 the staff consisted of 10,866 persons. Now it amounts to 73,571. The number of women employed in 1914 was 125; to-day it is close on to 25,000. In order to provision a part of these workers thirty-five canteens have had to be established.

At this great arsenal only components of shells are produced. Each shell, it is interesting to know, is the sum of many items. The cartridges are made in one place, tubes and fuses in another, propellants in a third. All these parts must be "married," as the phrase goes, into a complete round. This "marriage" is consummated at the National Filling Factories, of which there are seventeen throughout Great Britain. Their capacity is considerably more than 50,000 tons a week. This output would cover five acres of space and would require 5000 railway trucks for transport.

Each one of these Filling Factories has a specific task. Some fill shells; others fill cartridges, while still others assemble the 18-pounder ammunition. Four of them fill fuses and tubes exclusively.

The great arsenal to which I have referred happens to be a combination of all ammunition activities in that it produces component parts and fills. Here you see acres of shells of every kind and description. The deadly high explosives—"H.E."—are always yellow in colour and are handled with much greater care than any other type. The field-gun shells are black. The large ones are in wicker baskets to expedite handling, and look like jugs of death.

An ammunition supply Depot is something like the great Base Supply Depots operated by the Quartermaster-General. Everything is systematized. The munitions are kept in huge storehouses. The officer in charge of each one of these structures is required to keep what is called Storehouse Tally, which is a complete and up-to-the-minute record of supplies received

and issued. Thus he can tell at any time just how many shells of every variety he has on hand. Since there is always the hazard of air-raids, each battalion of shells is safeguarded by piles of sand-bags. The precautions against fire are most stringent. The penalty against smoking is everything but death.

The same system follows the ammunition from the moment it leaves the storehouse or the Filling Factory to the ship, where it is loaded for France, Salonika, Egypt, Mesopotamia or Africa. Indeed, a record is kept of every shell until it goes into the gun.

The system of railway transport in England is typical of the completeness of the organization. For every railway truck there is an army truck card which contains a description of the stores, the number of shells, the hour loaded and the destination. A duplicate of this truck card is kept at the storehouse; another goes with the car as a voucher. It is tacked on the outside so that the receiving officer can check up the freight at once. A complete ammunition train consists of fifty trucks. More than one thousand trucks are loaded every day, and there is a continuous procession of trains rushing daily toward the three ports in the south of England, where every night the ships depart with their cargoes of destruction. Each ship carries a manifest of its freight in duplicate. One of these is retained by the receiving officer in France or elsewhere, while the other goes back as a receipt for goods received.

Coincident with the departure of the ammunition ship a telegram is sent to the Director of Ordnance Service at G.H.Q. apprising him of the shipment. This wire is in no way an advice for shipping purposes, but is sent to give the D.O.S. immediate information about what he is receiving. Here again you get illuminating evidence of the value of knowledge in warfare. As in the supply of food, the whole aim is to give the fighting man immediate intelligence of what is being done for him. It is the antidote to worry. Long experience

has proved that anxiety about supplies in war is far more deadly than enemy bullets.

With ammunition distribution you find another interesting parallel with food. Some of the ships carrying munitions use the French ports that supply the Northern Lines of Communication, while others make the southern ports for the Southern Lines. Immediately upon their arrival across the Channel the shells are landed, loaded into trucks and distributed to the various base and field Supply Depots under instructions from General Headquarters.

In France there are six immense ammunition depots, three on the Northern Line and three on the Southern. Each Depot keeps a supply of 35,000 tons of ammunition. This includes about 17,000 tons of boxed ammunition, 14,000 tons of heavy ammunition and 3700 tons of trench warfare stores and small-arm ammunition.

Ammunition is issued at each Depot and consigned to certain Railheads in the field, which become, in turn, the distributing points for the fighting units. These Railheads have a certain number of Army and Corps dumps to supply. I might state right here that any accumulation of ammunition in the field is called a dump. The word is self-explanatory. A dump may be an open field by the roadside, where the shells are stacked up on boards and covered with heavily camouflaged tarpaulins, or a temporary storehouse. The enemy would rather bombard an ammunition depot than successfully raid a trench. There is always a heavily armed guard at these dumps, and they invariably fly a white flag with a square blue field. This flag is the emblem of what is known as the Divisional Ammunition Column.

The transport of ammunition in the field is a very difficult proposition. From Railhead to dump the three- and five-ton motor-trucks are used. They are always marked with a white shell and take precedence over all other traffic. From the dump up to the firing-

line our old and tried friend, the Horse Transport, is the carrier. As with food, these horse and mule-drawn vehicles are the patient and unswerving link with actual battle. They usually go up at night when the way is dark and full of troubles. In the first battle of the Somme and in Haig's great push in Flanders last November, when the weather remained persistently pro-German and the roads became so nearly impassable that even Horse Transport could not be used, thousands of shells had to be sent up to the front on the backs of mules and horses, and were even carried by hand.

Some shells, however, are so huge that they require mechanical transport. A whole system of tractors is engaged solely in the work of conveying howitzer ammunition from Railhead to battery. In some instances light railways are used. I cite these facts merely to show how infinite is the variety of specialized labour imposed upon the armies in the field.

The item of gun supply does not call for any elaborate explanation. Just as a lathe is a lathe, a gun is a gun. The Master-General of Ordnance is charged with the task of renewing old ordnance and supplying new cannon. Except where a gun is absolutely put out of commission by a shell it is salvaged, and in 80 per cent of cases is restored to service. Throughout the zones of fighting you find so-called Gun Parks, where you see row after row of guns of all calibres with limbers and other equipment ready to take their place in the battle-line. Once more the reserve supply is the insurance against disaster.

Ordnance in this war means a great deal more than shells and guns. As a matter of specific fact it includes not less than eight thousand items, which range from a nail to a fire-engine. They come under the head of what is technically known as Ordnance Stores. The provision of this well-nigh incredible mass of commodities is under the general supervision of the Quarter-master-General, whose chief Aide is the official

known as the Director of Equipment and Ordnance Stores.

If you want to get some notion of what Ordnance Stores means, just take a trip to Woolwich and look at the so-called Ordnance Stores Museum. Here you will find a sample of every one of the eight thousand items included in the Vocabulary, which is the Bible of Ordnance Stores Supply. Every one of these items is sealed with the red War Office seal, which means that it is a pattern and has been officially adopted by the army. It ranges from camp-chairs to field communion sets. Contractors who want to compete for army bids come here and examine the models. Sometimes a model is sent to a local Chamber of Commerce located in a city which happens to be a centre of a manufacturing district.

The matter of Ordnance Stores in the army is, of course, vitally important. In order to prevent omission of any article, what is called a Mobilization Stores Table is provided for each unit, whether it be an infantry battalion, battery of light or heavy artillery or hospital corps. This Table serves as a record of the war equipment of the unit. It itemizes every article needed by the unit. In the concrete case of an infantry battalion it includes such articles as bags, mess tins, whistles, pistols, wire cutters, web equipment, which includes belts, braces, haversacks, packs and carriers for cartridges and entrenching tools, bugles, drums, axes, buckets, cooking utensils, ropes, horse blankets, shovels, harness, saddles, compasses, blankets, bicycles, stretchers, arms, clothing and scores of other commodities too numerous to mention.

Despite this immense number of stores a complete record is kept of every item. The Quartermaster of the unit is held responsible for issue and consumption.

The provision of these ordnance stores is in itself a full-sized job. It is as completely and as scientifically organized as the contracting and purveying of food. In fact it is a replica of the system adopted by the

Surveyor-General of Supply, and which has been described in a previous chapter. The specifications are printed and sent to prospective bidders. Once the contract is made the goods automatically pass under an incessant scrutiny. This is technically known as Inspection of Ordnance Stores.

The inspectors are called Viewers. They are civilians drafted from mill and factory who are the best experts available. Each Viewer has a specialty. It may be iron, wood or wool. At Woolwich, for example, which is the centre of an extensive inspection district, there is an admirable system of keeping tab on the work. Each inspector is indicated by a flag, which is the colour of the type of work he inspects. A red flag indicates iron work ; the blue is wood, and so on. Each man's name is on his flag. If the Chief Viewer wants to know where John Jones, wood inspector, is, he simply looks at a huge chart on the wall and finds his flag. If John Jones is inspecting at Manchester the flag will be stuck in the circle marked "Manchester." If he has need of John Jones's services in a neighbouring city he can at once assign him to the contract without delay. It is the science of business as having just one more manifestation in the work of the war.

X

A VISIT TO SIR DOUGLAS HAIG

FOR days I had run the gamut of the guns ; ranged the whole long British battle-line until the world seemed a chaos of trench and traffic shaken by a deadly din. Suddenly I came to a quiet backwater in this whirlpool of war.

It was a modest château well off the beaten road, so screened by French poplars that its quietude suggested the aloof and untroubled days of peace. The red flag that fluttered at the gate, the presence of more than the usual number of sentries, the distant rumble of artillery, were the only external evidences that this secluded house which basked in the winter sun was linked with the world's greatest conflict.

Yet amid those friendly trees is the nerve centre of the mightiest English military machine ever created ; from its pleasant drawing-room that looks out upon an Old-World garden are issued the commands at which millions of armed men leap to action ; towards it countless anxious hearts turn every day for the tidings of cheer or despair. For here are the headquarters of Field-Marshal Sir Douglas Haig, Commander-in-Chief of all the British Armies in France and Flanders.

I have seen army and corps headquarters far more pretentious than the domicile that shelters the chieftain of them all. It is characteristic of the silent soldier who literally wields the power of life and death that



From a Drawing by Francis Dodd

FIELD-MARSHAL SIR DOUGLAS HAIG,

the seat of his fateful authority should be like the man himself—simple, dignified, impressive. You get a hint of Haig before you see him.

The environment of the Commander-in-Chief is strongly suggestive of his conduct of the war. Before war became a thing of precise science the headquarters of an army head seethed with all the picturesque details so common to pictures of martial life. Couriers mounted on foam-decked horses dashed to and fro; the air was vibrant with action; the fate of battle showed on the face of the humblest orderly.

But to-day headquarters are totally different. Although army units have arisen from thousands to millions of men, and fields of operations stretch from sea to sea, and more ammunition is expended in a single engagement than was employed in entire wars of other days, absolute serenity prevails. It is only when your imagination conjures up the picture of flame and fury that lies beyond the horizon line that you get a thrill.

An occasional motor-car driven by a soldier-chauffeur chugs up the gravel road to the château, and from it emerge earnest-faced officers whose visits are usually brief. Neither time nor words are wasted when myriad lives hang in the balance and an empire is at stake. Inside and out there is an atmosphere of quiet confidence, born of unobtrusive efficiency.

This is due, first, to the fact that it is the Haig way of doing things; second, to the consideration that war now is a vast and well-oiled industry, carried on with such perfect organization that to the American trained to study the mechanics of huge corporations in his own country it seems strangely familiar. Make the most elemental comparison and you see at once how close the parallel is.

That modest château, hemmed in by poplars, is nothing more or less than the executive office of the deadliest but best organized business in the world. It houses the mainspring of the most colossal system

of merchandising that commerce has ever known. Strip away the glamour and you have merely merchandising with men instead of goods. You have every consecutive process of business evolution. Instead of representing the conversion of pig-iron into motors you have the translation of raw human material into expert fighting men.

The Commander-in-Chief bears the same relation to the carrying on of war that a master sales manager bears to the dissemination of a product. His task is to deploy his output where it can hit the hardest, and on the success of his alignment his cause stands or falls.

What would represent profit in trade is here expressed in terms of advance; in territory gained. The highest dividend is victory, the permanent aftermath is peace and liberty.

Study Haig and the British Army at close range and you find that War is Work—the most difficult, desperate and unremitting labour that the hand and brain of man ever devised. The price of freedom, as fought for on the battlefields of Europe to-day, is infinite but organized toil knit by sacrifice and fed by patriotism.

To write of Sir Douglas Haig is to write not only of the conspicuous military leadership, but also of the kindling response that an untrained and undisciplined people made to organized and long-pending aggression.

Ever since the beginning of the present war the average American has constantly asked himself: "How is a war involving millions of men and extending over an immense area conducted?" He is baffled by problems of transport and communication, demand and supply. Shells are no respecters of hunger or sleep. He marvels that armies of two nations speaking different languages and operating in separate spheres can co-operate and co-ordinate. All this and much more piles up the huge question: "How is it done?"

You find much of the answer crystallized in one word—team-work. It is the essence of the formula which expresses the success of Sir Douglas Haig and explains the advance of the British Army. If such a thing were possible you would find it emblazoned over the doorway of that unassuming headquarters château "somewhere in France."

Thus the get-together idea, which in war spells the brotherhood of the firing line, lies at the very root of all that the British khakied host has achieved on the Western front. Its guide, compass and friend is the Commander-in-Chief. At his disposal are placed the human battalions; all the materials with which to feed and fight. Up to him is put squarely the task of translating these units into victory.

To get at the procedure you must first have some revelation of the man, his personality and his methods. In them are reflected the whole process by which battle is made. Know them and you learn what costly and actual experience alone can teach—that the path of glory is paved with innumerable unromantic and lustreless details, and that the soldier who goes forth to do or die is a cog in a mighty and militant machine.

You have only to carry the analogy with commerce one step farther to discover the thing that dominates and makes possible every important American co-operative undertaking: namely, a highly centralized direction vested with complete authority. In this case it happens to be the Commander-in-Chief, or, in plain business terms, General Manager of the British Armies, Unlimited.

Disclose the Haig make-up and you also reveal the human stuff that leads the forlorn hope. It is the universal fibre of the British soldier. The moral of it is that you cannot get away from that ancient maxim: "Like officers, like men."

To the human interest historian Haig presents a curious paradox. Ask any man that you meet

casually in London what he knows about the Commander-in-Chief of the British Armies, and he will reply at once: "Why, he is a great soldier." Press him for further illuminating facts, and the chances are that he will hesitate and then say: "The fact is, I don't really know any more." It would be a typical experience in the hunt for Haig data.

The first of the many striking things about Sir Douglas Haig lies in the amazing anomaly that, although his name appears every day in millions of newspapers throughout the world (he signs the daily reports of British operations in France), he is perhaps the least advertised factor in all the tremendous drama that he directs. When you meet him you discover the reason.

He is the personification of personal modesty—not the professional modesty which is one of the surest roads to publicity, but a deep-seated and sincere aversion to exploitation. He shuns the spotlight.

I have talked with men who have been his comrades from South Africa to the Somme. Save for the most superficial information they know nothing about him except that he has "made good" wherever he has been put. "He doesn't talk much; he is a Fifer," they say.

Right here you get the first ray of light on the Haig reserve, for he was born in that little kingdom of Fife, where courage is as adamant as its granite hills, and whence sprung the Clan MacDuff, foremost fighters of a fighting race. The imperturbability of those brooding hills is in his soul. It has helped to make him the soldier that he is.

It girded him with the strength and perseverance to lead the famous ride to the relief of Kimberley; it bore him through the heroic retreat from Mons; it sustained and fortified him when he rode serenely down the shattered line of Ypres and gave life and lift to one of the most brilliant stands that military

resistance has known. Sir Douglas had cut his fighting teeth when he succeeded Lord French as Commander-in-Chief in France.

Despite his long record of achievement his name was far from being a household word like that of Kitchener and Roberts. But the important fact was that the troops knew him—knew to their pride and to their satisfaction that the new leader, like the old, had been flame-tried, and not found wanting.

I like to remember my first glimpse of the Field-Marshal. It came after unforgettable days and nights with armies that flirted with death above and upon the ground. His name ran like a strain up and down the line. I had watched troops returning from a raid that had netted a good bag of prisoners, and heard the jubilant officer say: "This will be good news for the Chief at G.H.Q." It was more like the enthusiasm of a football player after a hard-won game than the satisfaction which followed a desperate dash that took its toll of youth and blood. But it was typical of what the man on the job thought of the man higher up; and it expressed also, I might add, the spirit of the English officer who looks upon war as a great adventure.

And so it came about that after a vicarious apprenticeship to the trade of war I came upon its master-workman. It was a brilliant sunlit winter day. Behind me on the main highways I had left the endless ammunition trains, the trailing squadrons of motor-trucks, the rattling processions of artillery—all the clatter and paraphernalia of war transport. Only the boom of guns still pounded in my ears. They had echoed so long that they seemed part of the very noises of nature.

We turned off the chief artery of traffic and travelled for miles along sequestered ways. Soon a single château loomed above its ivied walk, and almost before I realized it we had run the gauntlet of the sentries at the gate and had brought up before a doorway that

would have delighted the heart of an architectural enthusiast.

There was the usual courteous greeting so instinctive with the British officer, whether you waded up to him through the mud of a trench or meet him amid the comforts of humane habitation.

In France all the headquarters of the various British Armies are very much alike in that they are established in châteaux. And instead of being commandeered, after the German fashion, they are rented and paid for in pursuance of the laws of decency and honour. Whether by accident or design, the General Headquarters are smaller and more unpretentious than any of the others. One reason, perhaps, is that Sir Douglas Haig is surrounded only by his personal staff; the other officers who comprise his field cabinet live in other quarters.

The establishment over which the Commander-in-Chief presides is practically as its owners left it. A few years before laughing children had played under its arch and glad voices had resounded through the hall that stretched behind. Although now an outpost of war, it still breathed some of the gentle atmosphere of peace. The continuous jangle of the telephone was the only harsh sound that broke what seemed to all intents and purposes the ordinary calm of a well-ordered French country house. Save for that and the constant movement of officers you would never guess that from within these walls issue the orders that, translated into action, are changing the map of the world.

The château that the Commander-in-Chief occupied prior to the time when I visited him was even less touched by war. It was still tenanted by the old French family, whose home it had been for years and who inhabited one of the wings. Hence it came about that in those soul-stirring days, when the first Somme offensive was being planned and executed, the voices of children running up and down the halls mingled

with the incessant murmur of the guns and the work of that devoted band of men who were directing one of the most stupendous operations in the history of all war.

The moment you enter "G.H.Q." you feel that you have established a contact with something significant. I do not mean that there is the slightest tension, but, whether it is the play of the imagination or not, you acknowledge an authority that you have never felt before. It is the unconscious tribute you pay to the personality that dominates the place.

The desks, maps and eternal telephone are in sharp contrast with the ancient furniture and works of art that still remain in the house. The old family portraits look down solemnly upon you from the walls. They hear and see strange things these strenuous days—nothing stranger than the spectacle of the once detested English in the rôle of defender of the invaded and beloved France.

I sat chatting with a young staff officer in one of the small anterooms that led off from the main hall. His telephone bell rang incessantly. During the lull the door to my right opened and remained open after a military secretary had passed out.

I looked through the doorway and saw a tall, lithe, well-knit man with the insignia of a field-marshal on his shoulder-straps. He sat at a plain, flat-topped desk earnestly studying a report. In a moment he straightened up, pushed a button, and my companion said:

"The Commander-in-Chief will see you now."

I found myself in a presence that, even without the slightest clue to its profession, would have unconsciously impressed itself as military. Dignity, distinction and a gracious reserve mingled in his bearing. I have rarely seen a masculine face so handsome and yet so strong. His hair and moustache are fair, and his clear, almost steely blue eyes catch you, but not unkindly. His chest is broad and deep, yet scarcely broad enough for the rows of service and other ribbons

that plant a mass of colour against the background of khaki.

The Commander-in-Chief's cavalry training sticks out all over him. You see it in the long, shapely lines of his legs, and in the rounded calves encased in perfectly polished boots, with their jingle of silver spurs. He stands easily and gracefully, and walks with that rangy, swinging stride so common, oddly enough, to men who ride much. He was a famous fox-hunter in his student days at Oxford, and never, save in times of utmost crisis, does he forgo his daily gallop. To him the motor is a business vehicle, never meant for sport or pleasure. In brief, Sir Douglas Haig is the literal personification of the phrase "every inch a soldier."

I have seen most of the chiefs of the Allied Armies in this war. It is no depreciation of any of them to say that the Commander-in-Chief of the British Army is the best-groomed and most soldierly looking of them all. He has none of the paternal quality which impresses you the moment you see Joffre; he is smarter and more alert in appearance than Nivelle. Amid all the racking burden of a super-responsibility, he remains a cheerful, interested human being, who can forget in the distraction of lay discussion the agonies that lurk almost within gunshot of his residence.

The room which is to-day the Capital of British military sovereignty in France is a conventional drawing-room which, like the rest of the house, maintains practically every detail of the original furnishing. But it is a soldier's workshop, nevertheless, and with all the working tools. Chief among them is an immense relief map of the whole Somme region. It rests on a large table just behind the Field-Marshal's desk. Over this inert and unresponsive mass of grey and green clay, criss-crossed with red lines, he has pondered through many a wakeful hour. On it is written the whole triumphant story of that great advance which registered a new glory for British arms.

I could not help thinking as I sat there before a blazing fire what a great place in history that simple room would have ; how in years to come it would be known as the real setting of the decisive phase of the Great War so far as land operations are concerned. We spoke of many things that winter day in France : of America, of world politics, of the spiritual aftermath of the war—strange contrast that it was to the business of slaughter that raged around us.

His voice is low and deep—almost musical. He is as sparing of words as he is of men. In his conversation he reminds me of some of those great American captains of capital—men like Rogers, Ryan and Harriman, who, like himself, believed in action and not speech ; them, too, who minimized the value of their own utterances, and who, when drawn out of the shell of their taciturnity, disclosed views of force and originality.

Like many men of great reserve, the Field-Marshal would rather face the jaws of death than an interviewer. Indeed, you might count on the fingers of one hand the number of times that he has actually talked for publication, and then have some to spare.

Yet this quiet man, at whose command the very earth trembles with passion and noise, is very human. One of the ironies of this war is that the most inhuman of professions is directed by the most human of men.

He asked me what I thought of the work of the armies in the field. I told him that, after their efficiency, *moral* and splendid team-work, one of the things that impressed me most was the youth that I saw everywhere—a rosy, almost radiant youth, that walked into death so blithe and unafraid !

“ Ah,” he said, with thrilling enthusiasm, “ war to-day is a young man’s game. It is a war of youth and it takes youth to win.”

I spoke of the many men who had risen from the ranks. It seemed to strike a responsive chord, for he said swiftly :

“ Yes, it is very true. Every man in this war has his chance. Efficiency counts above all other things. You cannot afford to have friends.”

In this connection it is no breach of confidence for me to repeat something that Sir Douglas Haig once said to a friend of mine, who is a well-known English editor and who had made the usual comment on the extreme youth of the great bulk of the British Army. Haig's answer to him was: “ Why wouldn't a soldier be young? Would you choose men of forty to plan a championship football game? War is more strenuous than the fiercest football game.”

I was with Sir Douglas Haig in those momentous days when America broke off diplomatic relations with Germany, and when those of us temporarily exiled abroad realized that the time had at last come when we would actively take our place in the line-up of the Great Cause. It naturally led to the subject of what war had done for the overseas people—and this meant those gallant sons of Empire who had heeded the call of the mother lioness and had left bush and range and field to fight in far-off lands. The Commander-in-Chief's face kindled with pride as he said:

“ War, harsh as it is, is also the great maker of men. Take the Australian, for example. Every one knows that he is as proud as he is undisciplined. Yet war has made him a trained and disciplined soldier, and more than that, a world citizen. The same is true of the Canadian, the South African and the New Zealander; indeed, all those intrepid men who have sacrificed so much for principle and for honour. They will go back to their homes better equipped and better organized for the task of peace.”

Rash prophecy is remote from the Haig scheme of life. Although inarticulate about himself, he has always favoured the frankest publicity about his army and the performance of his men. The brief and business-like reports of operations that emanate each day from his headquarters (they are almost epi-

grammatic) are eminently characteristic of the man whose name they bear.

Yet behind the unvarnished statement that "a trench was taken at ——" often lies an unwritten classic of courage—an unheralded epic of sacrifice.

But underneath all this poverty of expression lies a mine of unexplored human material whose richest vein is the real personality of the man himself.

War has raised him to eminence without disclosing those intimate facts which are so necessary to the study of an individual and his achievement. Because of this lack of published information, no less marked in Great Britain than in America, it seems worth while to dwell for a moment on the story of his life. This will help you to understand why he has travelled so far and how he has welded those hosts, gathered from the uttermost ends of the earth, into a coherent, elastic, ever-ready and dependable force that works with the precision of the most delicate mechanism.

Most people know that Haig is a Fifer, but what most people do not know is the very illuminating fact that from his boyhood he aspired to be a soldier. This ambition took definite form at Oxford, when he was a student at Brasenose College. He was never the "hail-fellow-well-met" sort of person. Reserve was his hall-mark. But he was always an outdoor man; he invariably rode a big grey horse every afternoon, and he spent all his leisure time fox-hunting.

In those days to be an officer was more of a luxury than a real profession in England. The country had so adapted itself to the buying of commissions that when a man regarded the Army as a definite career he became marked. As a matter of fact, as Haig galloped through the streets of Oxford and across the lovely countryside that lies adjacent he was often pointed out. His colleagues would say: "There goes young Haig. He's going to be a soldier."

Little did they dream that the fair-haired boy who

sat so erect in his saddle would lead one of the greatest armies in the annals of military endeavour, and that he would be the inspiration that makes soldiering a sacred calling.

Then, as now, Sir Douglas gave the impression of a great store of latent energy—of reserved vitality. Few were ever deceived by his quietness into thinking that he was apathetic.

His first military experience was in the cavalry, which he has always loved, and his initial promotion came from gallant service on the hot sands of Sudan. In the South African War he took first rank as a cavalry leader. He had so many narrow escapes from death that he came to be known as "Lucky Haig."

As you analyse the Haig personality you find that he has an amazing insight—a real gift of constructive forecast. His appraisal of the German menace will illustrate. More than twenty years ago he went to Germany for a visit. As a result of that journey he wrote a long letter to Sir Evelyn Wood that, in the light of the bloody events of the present, is little short of uncanny. A friend who saw that letter has summed it up as "one of practical insight, masterly of detail, shrewd prophecy and earnest warning." The future Commander-in-Chief of the British Armies in France was convinced then of the inevitableness of a conflict with the Kaiser, and he felt strongly the urgent need of preparedness for that struggle which he knew would uproot all Europe.

But his warnings, like those of his great colleague, Lord Roberts in England, and those of General Leonard Wood of America, fell on deaf and unheeding ears. I cite this episode merely to show that Haig, like many another prophet, was without honour in his own land, and also that he has the quality of vision which is the indispensable attribute of every leader of men.

He had ample opportunity to impress his executive ability as Chief of Staff in India, and he had just begun

to execute some of his striking ideas of training as commander at Aldershot (England's great military camp) when the Great War broke out. He was in at the beginning, and he has been on the firing-line ever since. In the rack and agony of those first fighting months he saw the hideous harvest that unpreparedness reaps.

Of those two heroic Army Corps—the famous “First Seven Divisions”—that Lord French took to the rescue in France in that historic August of 1914 (the intrepid array, by the way, that the Kaiser called “the contemptible little English Army”), Haig commanded the first, which included much of the cavalry.

From Mons to Ypres he was in the thick of battle, never depressed, never elated, his courage and example acting like a talisman of strength on tired and war-worn troopers who fought valiantly against odds the like of which had hardly been recorded since Thermopylæ. It was such a continuous tale of heroism, in which the humblest Tommy had his full share, that it is difficult to extract a single incident.

Out of all that welter of work and fight let us take one story which, almost more than any other, reveals the grit and stamina that are Sir Douglas Haig's. It was at the battle of Ypres, when that immortal thin line of British khaki, bent but not broken, stemmed the mighty German avalanche and blocked the passage to the sea. Outnumbered more than ten to one in some places, it fought with that desperate and dogged tenacity which has always been the inheritance of the British soldier. Every impromptu trench was a Valhalla of English gallantry. Deeds that in other wars would have stood out conspicuously were here merged into an endless succession of deathless glory.

Lord French, the Commander-in-Chief, had been down to the front line. “We can't hold out much longer,” said a colonel. “It is impossible.” “I only want men who can do the impossible,” replied Lord French. “You must hold.” And the line held.

To the right of Ypres things were going badly. The deluge of German shell was well-nigh unbearable. Even the most heroic courage could not prevail against such an uneven balance of strength. The cry was for men, and yet every man was engaged.

It was on that memorable day—for ever unique in the history of British arms—that cooks, servants and orderlies went up into the firing-line, and the man who exchanged the frying-pan for the rifle achieved a record of bravery as imperishable as his comrade long trained to fight. Still the lines shook under that mighty Teutonic assault. It seemed more than human endurance could possibly stand.

Meanwhile Sir Douglas Haig had been ordered into the shambles with the First Corps. They manned the bloody breach and won for all time to come the title of the Iron Brigade, even as Haig himself in other and equally strenuous days had gained the sobriquet of "Ironside." The old metal rang true.

Now came the event which bound the silent Fifer to his men with bands of steel. For twenty-four hours the furies of battle had raged. The German bombardment was now a hideous storm of dripping death. The Prussian Guard rose like magic legions out of the ground. They had just broken through one British line, and small parties of khakied troops were in retreat.

Suddenly down the Menin road, with Ypres silhouetted behind like a mystic city shrouded with smoke, rode Sir Douglas Haig—trim, well-groomed, serene, sitting his horse erect and unafraid, and with an escort of his own 17th Lancers as perfectly turned out as on peaceful parade. Overhead was the incessant shriek of shells, and all around carnage reigned. A thrill of spontaneous admiration swept those tired and battered troops, for the spectacle they beheld was as unlike war as night is unlike day.

The effect of that calm and confident presence acted

like a cooling draught on a parched tongue. It galvanized the waning strength of the gory trenches; the retreat became an advance, and the broken line was restored. Haig had turned the tide.

I have seen that Menin road down which Haig rode with that unuttered message of faith. Two years had passed, but it was still the highway of death, for shrapnel rained all around. It was accessible to the civilian only if he was willing to take his own risk. How much more deadly was it on that day when the blue-eyed man who now rules the British Armies in France gave that amazing evidence of his disregard of danger! I thought of it then, and again on that winter day when I sat talking with him amid the comparative ease and comfort of General Headquarters. I spoke of it as one of the superb acts of the war. The Field-Marshal merely shrugged his shoulders, and said,

"It was nothing."

A few days after the event that I have just described Haig had one of his close calls from death. A German shell burst in the midst of his headquarters, and nearly every one of his staff officers was killed or maimed. The Field-Marshal was out on a tour of inspection at the line. "Lucky Haig" again.

When Haig became Commander-in-Chief of the British Armies in France it seemed the logical goal of a long, stalwart preparation—the inevitable thing. For deep down under the Haig character, and, incidentally, behind his distinguished achievement, are two shining qualities—patience and perseverance. He has never hesitated to do what we in America call "spade work." It is sometimes prosaic, but it is usually effective.

Contradictory as it may seem when you consider his Scotch ancestry, there must somewhere be a touch of the Oriental in Sir Douglas Haig. I mean, of course, that phase of his character which finds expression in persistent and methodical preparedness.

His whole career is literally a dramatization of an ancient Moslem proverb which reads, "Patience is the key to Paradise."

Take the Somme offensive. Nothing could express the Haig idea better. For months everybody knew that the "Big Push" was booked. There were many times during the lull that preceded the advance when men less cautious would have loosed the dogs of war that tugged so hard at the leash. But the Field-Marshal, with that super-patience, waited until the last and most minute detail was ready. Then he shot his bolt, and it went home. It was a triumph of the readiness which is the basic principle of the Haig creed.

What is known as the "Haig nibble" is another conspicuous example of his technique. In this war the open engagement is the rare exception. After the first few months it developed into a trial by trench—a wearing-down process. "Attrition" is what the experts call it. Nothing could suit the Field-Marshal's temperament better. A method of campaign that would discourage most commanders and lead them to indiscretion has made it possible for him to push steadily and stolidly on.

This, then, is the type of man who sits at the flat-topped desk at General Headquarters with his finger on that battle pulse, responsive to its remotest quiver. The marvel of motor, telegraph and telephone enables him to be in constant touch with every unit of his command. Follow him through his day's work and you see how the war game is played—a war that, having tested the resource and the resiliency of all Europe, has now extended its dread domain beyond the reaches of the Atlantic to the shores of America. It is the titanic task!

And when this moving picture, more animated than any imaginative play ever thrown upon cinema screen, has passed before you, you realize, even before a single shot is fired, that dynamic energy and

organization of the highest order have been tested to a well-nigh incredible extent.

Since the Commander-in-Chief himself is the incarnation of systematic labour, it follows that the daily procedure of that modest establishment which he rules "somewhere in France" is efficient and effective. Taking its cue from the top, it lets nothing disturb the tenor of its way. Triumph or disaster is treated just the same. The unflinching discipline which binds the Head of the Armies to his closest colleagues has made possible a consistent and unwavering progress of the war.

Every morning at nine o'clock Sir Douglas Haig is at his desk, and from that time until the lunch-gong sounds he is in conference with the heads of those various branches of the service whose efforts comprise the total of war operations. Upon his desk are heaped the reports of everything that happened the night before. A raid on forty yards of trench many miles away may reveal information of the utmost importance to the whole army. Thus the office becomes a clearing-house of information, and out of it emerges the news, grave or cheering, that is flashed to a waiting world, and likewise those more significant commands whose execution makes history.

The process of assembling and assimilating all the news of that extended front is reduced to a very simple science. This is because each army unit has its own headquarters—a replica in every detail of the general establishment. The difference between these lesser headquarters and the Chief's is that at the former must be handled, in addition to actual fighting and flying, the terrific task of providing food and ammunition, ambulance and hospital relief, remounts and renewal of rank and personnel.

The mystery of close and continuous contact between the Allied Armies is easily explained. It is accomplished by means of what is known as a liaison officer, or group of officers. They are precisely what

this French word means—a connection. There is a French *mission*, or *liaison*, with all British commands, and vice versa. Through this medium all communication is made, and all news of operations transmitted. It is swift, simple and direct.

So, too, with that monster agency of devastation—the modern battle. Go behind the scene and you find that, like every other detail of the war, it is merely a matter of systematic, calculating detail. It is like a super-selling campaign conducted by the best organized business concern in the world.

In former days, when wars were decided by a single heroic engagement, armies stood on their arms for hours before battle while the commander rode up and down the lines giving the men cheer and encouragement. To-day the commander who tried that trick would last about two consecutive seconds, because the long arm of artillery which has annihilated distance would also wipe him out.

Instead, the Commander-in-Chief remains many miles behind the front, bound to it by every means that instant communication devises. He has before him photographs of every inch of enemy ground, taken by aviators. The wonderful thing about this battle-planning is that by means of these aerial pictures it is possible to keep the panorama of battleground up to the very minute. In winter, for example, a fall of snow will greatly alter the whole situation. But the aerial photographer gets around this by making a series of pictures that show the enemy trench, before, *during* and after the snowfall.

The plan of a great campaign like the Somme is built out of months of preparation and conference. The Commander-in-Chief decides on the general scheme, while the specific tasks are assigned for execution to the various army commanders. In other words, every chief and the men under him have a particular job to do, and it is up to them to do it. The total of these jobs, some of them requiring months

of solid effort, comprise the offensive. War nowadays is a series of so-called offensives enlisting millions of men and ranging over hundreds of miles of front. It is devoid of thrill; you never see a flag; it is literally the hardest kind of plain, everyday toil.

As you watch the organization of the British Armies in France unfold you become more and more impressed with their kinship with Big Business as we know it in America. Like Andrew Carnegie, Sir Douglas Haig leans on experts. He assumes that a man who has devoted a large part of his life to a specific task knows all about it, and is to be trusted. He has gathered about him, therefore, a group of keen, alert and live-minded advisers. Some of them served their apprenticeship in other wars; others have been swiftly seasoned in the present struggle. They represent the very flower of service and experience. It is a remarkable company—these men who move so noiselessly, who work so loyally, who keep incessant vigil with war.

There is still another link with business. In many large commercial establishments in the United States you find a so-called Suggestion Box. Into it the humblest employé may drop a suggestion for the improvement of the business. It ranges from a plan for a more methodical arrangement of office stationery to a whole new system of time and labour-saving machinery. In many cases prizes are offered for the best suggestions made during the year.

There is no such box at General Headquarters, but its informal substitute is the meal-table, where both civilian and soldier have free play, not only to inquire about the branch of service in which they are most interested, but to make any suggestions that may be born of observation. No recommendation is too modest or too far-fetched to have the serious and courteous consideration of the kindly man who sits at the head of the table.

Nor is all the talk of shop. War is subordinated to the less ravaging things that are happening out

in the busy world, where there is no rumble of guns, no clash of armed men, and where life is not one bombardment after another. And sometimes, too, there is talk of those haunts and homes across the sea where brave hearts yearn and where the agony of war-suspense is no less searching than at the fighting front. They also serve who wait alone.

Into every detail of daily life at General Headquarters the Field-Marshal's character is impressed. After lunch, for example, he spends an hour alone, and in this period of meditation the whole fateful panorama of the war passes before him. When it is over, the wires splutter and the fierce life of the coming night—the army does not begin to fight until most people go to sleep—is ordained.

This finished, the brief period of respite begins. Rain or shine, his favourite horse is brought up to the door and he goes for a ride, usually accompanied by one or two young staff officers. I have seen Sir Douglas Haig galloping along those French roads, head up, eyes ahead—a memorable figure of grace and motion. He rides like those latter-day centaurs—the Austrian ranger and the American cowboy. He seems part of his horse.

Home from the ride, there are more conferences. Then dinner with its lighter but always instructive talk and its relief from the strain of work.

You have seen the picture of the average weekday at the nerve centre of the British Army in France. Now drop in on Sunday. The telephone still jingles, the typewriters click, there is the same movement of orderlies to and fro, the usual succession of conferences. But there is one other performance worthy of the day and eminently typical of the keen-eyed Scotchman who is the repository of so much British hope and fear.

At ten o'clock in the morning the long grey motor with its tiny British flag is at the door (it is the only car at the front carrying this insignia), the Commander-in-Chief steps inside and is whirled off

to the little Presbyterian church, where he sits with his brother officers and men and hears good old-fashioned Scotch orthodoxy preached by a "padre," as they call the army chaplain. The weather is never too bad or the pressure of those multitudinous reports for Sir Douglas Haig to miss a Sunday service. This devotion to the creed of his fathers is just one other evidence of the character of the fair-haired, blue-eyed soldier who is Pershing's chief brother-in-arms.

That modest establishment somewhere in France is early to bed, but more than one guest at General Headquarters on the way to his chamber has passed the office of the Commander-in-Chief and seen him—a silent, aloof, almost lonely figure—leaning over a map and beginning the nightly wrestle with the great problem that, reaching out from the friendly house amid the trees, affects the destiny and safety of the whole world.

In that closing picture is the revelation of Haig the Man and Soldier. His personality is the concentrated sum of patient, persistent and untiring effort. Lacking the brilliancy of spectacular natures, it combines those elements of stamina and perseverance that rear, in the end, the impregnable bulwark of confidence and success.

XI

ENGLAND'S WAR EFFICIENCY ENGINEER

WHEN you strip away the glamour from the Great War and analyse the larger results you find that nothing achieved so far is of more permanent value to the future than the infusion of business methods into the conduct of Governments. Just as the war itself is organized and operated upon a huge commercial basis, so have the Cabinets become Clearing-Houses for the best business brains. The hands that have moulded industry now shape the destinies of nations. Salesmanship has succeeded Statesmanship.

Never before in all history has there been such a shaking up of dry administrative bones. The professional European politician, born to office, is in the main a vanishing type ; his " pull " is a lost art. There is a definite reason. The billions consumed on the fiery altar of the stupendous conflict demand employment by men trained to the fiscal task, while the gearing of railways and industries to the titanic needs requires a specialized preparation for the colossal readjustments of peace.

In no Allied country have business talents been so completely commandeered as in England. With the exception of Mr. Lloyd George, Mr. Balfour and a few other seasoned office-holders, the Cabinet is a Board of Directors recruited from industrial pursuits that could sit on any problem of overhead.



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SIR ERIC GEDDES

cost and distribution that came up. In addition, practically every important war activity is either dominated or controlled by men who left their desks and counting-rooms to become Drive-Wheels of the Mighty Machine of War.

If this Commercialization of Government, as it might be called, had begun in the United States no one would have been surprised. Business is instinct with us. The fact that it was born amid the hide-bound traditions of British Statesmanship makes it one of the many miracles of a war of miracles. Nor does any single fact more eloquently proclaim Britain's determination to be a tremendous industrial factor when the war is over.

The evolution was interesting. When England went into war almost overnight she had a Government composed of professional statesmen. Save only Bonar Law, a retired steel-master, who was Colonial Secretary, a post, by the way, which did not call for a vast amount of commercial training, there was not a single man of practical business experience in the Cabinet. Not until Lord Northcliffe exploded his famous bomb-shell about the lack of high explosives which jolted Kitchener from his pedestal and led to the establishment of the Ministry of Munitions did the Government draw the recruits from commerce about its standard.

The Ministry of Munitions therefore represents the corner-stone of the Business Bulwark that the Empire has reared. Lloyd George was the first Minister of Munitions. He was not a business man, but he knew how business affairs should be conducted. He knew, too, that America had built her industrial supremacy on close-knit and scientific organization. He did what Andrew Carnegie or any other man of that type would do. He mobilized the Schwabs, the Edisons, the Henry Fords, and the Westinghouses of the Kingdom and made them his fellow-workers.

From every corner of the Empire he drafted ex-

perience. He wanted workers without stint, so he started a Bureau of Labour; he needed publicity, so he launched an Advertising Department; to compete successfully with the Germans he knew that he would have to employ every inventive resource that his country could command, so he founded an Invention and Research Bureau; he saw that the shirker and the slacker were still abroad in the land, so he unfurled the Union Jack in every mill and took over the control of British Industry; finally, with his Munitions Act he conscripted the workers at forge and furnace into an industrial army that was practically under martial law. He slashed red tape and he injected red blood into the Arteries of Government.

Such was the real beginning of the business conduct of the war so far as the British end was concerned. The startling results produced by the Ministry of Munitions convinced Lloyd George that the business man was one of the nation's chief assets—an asset which should be capitalized to the very last degree. When he suggested to Mr. Asquith and to his other colleagues in the Government the necessity for what amounted to a commercialization of war procedure he was met with the argument that “too many business men would spoil the Government.”

The little Welshman bided his time. When he became Premier in December 1916 he startled England with a Cabinet that represented the real business leadership of the Kingdom. Since that time the nation has taken steady toll of its commercial genius, until to-day the control of national affairs, and more especially the domination of the three great agencies of War, Food and Finance, are almost entirely in the hands of men who had spent their previous lives doing nothing more stirring or patriotic than rolling up great fortunes in railroads, shipping, banking or manufacture of some kind.

Premier in this Government by Business is Sir Eric Geddes, who is the Lloyd George of the New Era.

He is England's War Efficiency Engineer. "Let Geddes Do It" is the Slogan of imperial distress.

In less than two years and at the age of forty-two, Geddes has become a Prop of Government. There are many people of England to-day who believe that he has more than a fifty-fifty chance to be Prime Minister. If this happens—and nothing seems impossible in this war—it would represent the very last word in Commercialized National Control.

What is the explanation of Geddes? The answer lies in the fact that first, last and always he is a business man. He has regarded every one of the many difficult problems put up to him since the beginning of the war merely as a business proposition, applied his training and experience, and made good. This is the formula of what is commonly regarded as the most spectacular personal success of the war.

When I first met Geddes he sat at an obscure desk in a small office in the Armament Building. It was in 1915 and the Ministry of Munitions was in the making. Although he was the highest-paid railway official in England he was practically unknown out of his own field. When I last talked with him he was First Lord of the Admiralty, the post vacated by Churchill and Carson in succession, and all Britain hailed him as glorified Life-Preserver. He had galvanized the whole British munition output; he had put the British Military Railways in France on the map; he had reorganized the Admiralty on a business basis, and was facing the toughest of all his tasks—the suppression of the submarine pest.

In Geddes the Lloyd George history repeats itself. For the first two years of the war the present Prime Minister was shunted into every national emergency, whether it was a coal strike in Wales, a snarl among the Allies or the unravelling of some Governmental tangle. He went from post to post until he reached the top. Geddes is now the Super-Minute Man, ready to jump into the breach at the first sound of the fire alarm.

In the American vernacular he is always there "with the goods." You have only to take a survey of his life—it is as swift and stirring as a movie-film—to understand why he has been able to register every time. The approach to his star part in *Business-Managing the Empire* is an animated sermon on how to succeed.

Geddes was born in India of Scotch parents who returned to the Mother Country when he was very young. Being Scotch, he is thrifty with everything but his own energy. He practically ran away from home when he was seventeen. His father, convinced that he would come back, gave him a cheque for \$75 to be used for his return passage. When he got to New York (he went in the steerage of an Allan liner) he mailed back the cheque saying, in one of his characteristically brief letters, "I think it will do me good to go on my own."

Unlike most of the heroes of human interest romances he had more than the traditional fifty cents in his pockets. To be exact, his fortune was ten dollars. His first job was as typewriter salesman in New York. Then he drifted to Pittsburg, worked at the Homestead Steel Works for a dollar and a half a day and finally landed as section hand on the Baltimore and Ohio Railroad in West Virginia. The engineer in charge of the gang was L. F. Lorce, who later became president of the road.

For a time the section worked near a small station called Nicolette. The converted freight-car used as a lodging-house by the labourers and which Geddes now calls his first Pullman, stood on a siding close by. In his odd moments Geddes began to study train-dispatching and telegraphy. His teacher was the station agent, a kindly Irishwoman, whose sweetheart was the section foreman. In exchange for instruction he "passed" the trains for her—that is, officially signalled them by—while the agent was out with her young man. When she finally married him Geddes

got her position as station agent. Thus the future First Lord of the British Admiralty and a possible Prime Minister of Great Britain flashed signals and even switched cars for Baltimore and Ohio trains at an obscure point in West Virginia.

Geddes was big, brawny and restless. He wanted to see America, so he went to Alabama, worked as a timber "jack" and learned the lumber business at first hand. When he was twenty-one he sailed off to Australia, rode the range as a sheep herder and turned up a year later in India, where he took root for the time. His knowledge of railroading gained in America enabled him to become foreman of a gang of coolies building a light railway through the jungles. The moment he touched light railway construction he reached the work that was to qualify him in later years as a master war-wager. In five years he was Traffic Manager of Rohilkund and Kumaon Railway. After this, life for Geddes was just one promotion after another. He seemed to find the magic key and all doors opened to him.

Some of the Indian stockholders in his railway were also stockholders in the North-Eastern Railway in England. They began to write home about the construction wizard who had dropped into their midst. The English stockholders soon got the impression that he was too valuable a man to be wasted on Oriental jungles. At Simla one Wednesday Geddes got an offer by cable to come to the North-Eastern. On the following Saturday he was on his way. This is the Geddes system of doing things.

The North-Eastern is one of the richest roads in England. It skirts the humming Midlands and taps an immense coal and iron area. Geddes' first job was as Chief Goods Manager, which corresponds with a General Freight Agent on an American road. Geddes at once had the inspiration that would come to any wide-awake American traffic official. He decided to promote industry along his line. No one had ever

thought of this in England before. In the face of considerable opposition from the Board of Directors he established the office of Industrial Manager. The result was increased revenue and growing goodwill.

Now came one of those curious freaks of fate that bob up so often in the lives of men of action. Geddes got an offer to operate an Argentine railway at a salary that seemed fabulous. He took it up with the North-Eastern people, and while they could not meet the South American proposition they agreed to pay him what was then, and what remains, the highest salary ever paid a railway official in Great Britain. If Geddes had accepted that Argentine offer the chances are that to-day he would be the king-pin among South American railway operators instead of being a leading figure in the drama of the Great War.

When the war broke out Geddes was Deputy General Manager of the North-Eastern. The General Manager was practically a figure-head, so Geddes was really head of the system. He wanted to do his war bit, so he went to the War Office in September 1914 and said:

"You haven't any trained railway troops in France and I think you will need them."

"No, thank you," said the War Office, "we can manage very well."

That was before business sense had dawned on the War Office. It was the first of a long series of blunders with men and materials that cost the Empire dearly.

Eric Geddes is not easily discouraged. He returned to York, which is the centre of the North-Eastern system, and raised a railway battalion out of his employés. He became their Lieutenant-Colonel and the unit became part of the Pioneer and Sapper Division of the Royal Engineers. It was Geddes who helped to lay out a large part of the trench system which comprises part of the coast defence in the North of England.

It was impossible for Geddes to keep out of the war game. Destiny was working in his direction and it

manifested itself in the shape of a message from Kitchener, who asked him to come to the War Office. These two big and outstanding personalities had known each other in India. The first thing that K. of K. said was this :

"I am not happy about the railway situation in France. There is too much congestion of supplies and material. Can you go over and straighten things out?"

"Of course," replied Geddes. "I can start to-morrow."

But Geddes did not start to-morrow. The Red Tape Octopus squeezed out Kitchener's scheme, and Geddes had to go back to his railway battalion. For the second time England turned down the man on whom she now leans so heavily.

Geddes besought his Board of Directors to get him into the war.

"If you tender my services perhaps they will be accepted," he said.

The Chairman went to the Government, saying :

"We know we have a big man in Geddes and he is wasting his time training men."

But the Government still remained deaf. The old hostility of the dyed-in-the-wool regular for the civilian stood pat.

Once more Kitchener sent for Geddes. This time the War Lord was in the North, and Geddes joined him on his private car at Newcastle.

"I am uneasy about munitions," said Kitchener. "Can you come in and help us?"

Geddes had become accustomed to offering his services to the Government, so he made the usual assent, to which the Secretary of State for War responded :

"If no Munitions Department is established I want you to come with me to the War Office."

While Kitchener was arranging to fit Geddes into his scheme of things the Northcliffe exposure about shell shortage broke like a storm over England. When

it subsided, Lloyd George sat at a desk in an office at Whitehall as Minister of Munitions. With a stroke of the pen the British Government had created a whole new Ministry that was in many respects the very Hope of Empire. But this Department existed on paper. Lloyd George had to translate it into a going concern and do it in a hurry. He had never heard of Geddes, but his name was handed to him in a list of men eligible for work with him.

Three days later, Geddes and Lloyd George met for the first time. It was an historic meeting, because from that hour on the war was to give each one a tremendous opportunity, which was to be capitalized to the very last degree.

"What can you do?" asked Lloyd George, in his brief and abrupt fashion.

"I have no technical knowledge of shell-making, but I can get things done," replied Geddes.

"All right," rejoined the little Minister, "you will have every chance."

In May 1915 Geddes was made Deputy Director-General of Munitions, and took over the production of rifles, small arms, optical instruments, transport vehicles, machine-guns and salvage. It was Geddes who first began to retrieve empty shell-cases, and through a system of careful transportation made it possible for the Government to use brass cartridge cases at least a dozen times. He was one of the Fathers of Salvage.

In six weeks he had his whole machine going at full tilt. England suddenly found herself bang up against a serious munitions problem. Millions of empty shell-cases were coming in from America. These cases had to be filled; otherwise they were so much inert and ineffective metal. All the while the cry across the waters from France was "Munitions and Still More Munitions." British guns stood impotent before the German avalanche of steel.

Geddes saw that no munitions task was quite so

important as getting these millions of shell-cases filled. So he annexed the job. It meant more work for him, but one of his chief traits is that he is a glutton for work.

Factories had to be built or adapted, and an army of workers recruited and trained. To give you some idea of the technical difficulties of shell-filling let me say that there are exactly sixty-four items—that is, sixty-four component parts—in filling a single 18-pounder shell. Men and women had to be taught the care and use of deadly explosives. It meant the establishment of a whole new school of labour.

Geddes turned on the full current of his dynamic energy. He assumed control of the Royal Ordnance Factories at Woolwich, Waltham and Enfield. Before the leaves on the French hills turned red and brown that fateful autumn, British batteries were hurling back shell for shell in every bombardment that the German artillery made. The whole British offensive of September 1915 was due almost entirely to the fact that Geddes had stimulated the output of the shell-filling factories, and had put live and up-to-date American business co-ordination behind the men and the machines.

The astonishing parallel in the advancement of Lloyd George and Geddes now became marked. When Kitchener went to his death on the *Hampshire* and Lloyd George succeeded him as Secretary of State for War, the first question he asked when he took his new desk was :

“ Is Geddes free ? ”

Geddes was. It is characteristic of the man that he never permits a job to master him. He does the conquering. Part of his administrative creed is to organize his work so thoroughly that it can run without him. This is the reason why he has always been able to act as First Aid when the Hurry-up Call came. Lloyd George therefore found him ready for a new demonstration of his many-sided talents.

Like his lamented predecessor, Lloyd George was worried about the railway situation in France. He was getting the shells across the Channel, but the shells were not getting up to the men fast enough. The battle of the Somme had proved that England had all the ammunition she needed, but as the armies went forward the railways behind did not keep pace.

"Are you sure that the French railways can carry all the traffic?" asked Lloyd George.

"No, I am not," replied Geddes.

"Then make an investigation and report to me," was the injunction from the War Secretary.

Geddes went to France in mufti and made one of his swift and searching appraisals of the transportation system. Here he was on his chosen ground. He saw ammunition being mishandled; to use his phrase, "the stuff was bogged." Being a railway man he realized that the best and quickest way to get shells up to the fighting men was on light railways, which could be laid down or repaired overnight. He went back to Lloyd George and summed up his recommendation in a single sentence, which was:

"We must have light railways that can follow the guns as they smash the way up the line."

On the spot, Lloyd George made him Director of Military Railways at the War Office. The very next day, Field-Marshal Sir Douglas Haig, whom he had met during his investigation, offered him the post of Director-General of Transportation in France. He wired back:

"I have just accepted post of Director of Military Railways at the War Office."

Haig immediately telegraphed:

"Take both jobs."

Geddes accepted both positions, and now began a remarkable career as a dual personality that is without precedent in all war history. As Director-General of Transportation in France he had to requisition himself as Director of Military Railways at the War Office for

all the materials used in the field. For once the Consumer could find no fault with the Producer. They were ^{or} one and the same person.

Geddes began the work, which dramatized all his previous experience and put him in the War Hall of Fame. He found the railways in France congested; the rolling-stock broken down under the terrific drive for food, troops and ammunition; the rails and road-bed showing the effect of the incessant wear and tear. He faced a colossal and momentous job of reconstruction, because the railways meant life or death, and traffic could not be interrupted for a single hour. It was like rebuilding a Terminal like the Grand Central Station in New York City without interfering with the operation of a train. Geddes turned the trick.

He got his whole task down on paper first. He built a pyramid, with himself as Director-General of Transportation at the apex and divided into four main Divisions. One was Organization of Forces; the second was Technical and dealt with Equipment, Extensions and all allied activities; the third was purely Statistical, while the fourth had to do with Construction. He called this his Organization and Liaison Chart, because every one of these branches was literally married to the other. It was this close and constant team-work that won out.

In working out his organization Geddes did a very characteristic thing. He said to the Army Council in substance, "If I am to be Director-General of Transportation I must be master of *all* the highways." He therefore took over the control of the network of inland waterways which included all the canals of Northern France. Hundreds of thousands of tons of freight and thousands of wounded men move up and down their winding way each month.

Geddes had to use the French roads to haul his supplies. They were in bad shape from the interminable movement of men, food, munitions and supplies, so he became their custodian. Thus to his

growing activities he now added road-making. He reorganized the French quarries and moved the broken stone direct from hill to steam-roller. He kept the roads in repair with battalions of navvies that he brought over from England.

Not content with all this, he reached out and annexed the Domain of Docks and Dock Engineering. This work was formerly under the wing of the Army Service Corps. Geddes established a Department responsible for the repair and upkeep of all the Docks. This was a very essential work, because delays in the coming and going of supply ships would interfere with the Lines of Food Communication in the field.

Being a disciple of centralization Geddes farmed out the responsibility for the huge job that he had cut out for himself. At the head of each Department he placed a Director, who became the Geddes of that particular Branch, whether it was Roads, Docks, Transportation, Light Railways or Inland Water Transport.

Before long, Geddes was a Dictator, with an Empire all his own. He had to have a suitable capital, so he planted his flag just outside the little town which will always be famous as the General Headquarters of the British Armies in France. Here he built a remarkable group of offices. Technically they are called Transportation Headquarters, but in the popular history of the war they will always be known as Geddesburg.

These offices are really a community group. The central structure is so arranged that the moment you enter you can look down a long hall and see a succession of signs that not only indicate every man's office, but his job. These offices are arranged in order of seniority. The first, therefore, is that of the Director-General of Transportation. Next comes the Deputy Director-General of Transportation and so on. One value of this arrangement is that a man can see at a glance just the office he is seeking, because the function

of that office is revealed at the same time. It saves time and temper. This plan is a little sidelight on the way Geddes does things.

At the outset of his experience in France he was wise enough to call to his aid a group of trained regular soldiers who knew military requirements and who were familiar with conditions in the field. He once explained his reason by saying, "The trained soldier can do the soldier's job better than anyone else. For an expert job you must get experts and let them alone." I might add, in passing, that this is the simple little rule upon which Northcliffe has reared the structure of his whole success with newspapers and magazines.

Since his job was reconstruction, Geddes' first and foremost difficulty lay with raw materials. How to get them was the problem, because the head of every other Army and Navy activity was moving heaven and earth in a mad effort to obtain wood and steel. He had decided that light railways would save the whole Supply and Ammunition situation. In order to feed them he knew that the broad-gauge lines would have to be increased on a large scale. He further realized that to get new equipment for both light and standard gauge systems was out of the question in the brief time at his command. He determined to follow the line of least resistance. His campaign, therefore, resolved itself into getting new light railway material from mill and factory and drafting part of the existing standard gauge equipment from the going British railroads.

The first of these propositions was a simple matter of making contracts and following them through. The second bristled with troubles. All the railways in the United Kingdom were under military control, to be sure, but to commandeer rolling stock and tracks was little short of confiscation even under drastic war regulations.

Geddes decided to use diplomacy. He knew he

had to "sell" the British railway managers on the proposition of giving up part of their equipment, so he invited them to come to France and see the army in action and go over the whole railway system. Practically none of these men had been in the zones of the armies. They came, they saw, and they were conquered by Geddes. They went home convinced that the Director-General of Transportation ought to have everything he asked for. When he demanded hundreds of locomotives and thousands of freight-cars and hundreds of miles of actual track he got them.

It meant literally taking up a whole railway system in England and laying it down in France. This is why you see, as you travel along the French Lines of Communication to-day, North-Eastern locomotives hauling London and South-Western trucks on tracks that formerly gridironed the Midland System. It helps to make the Tommy feel at home.

By getting a ready-made standard gauge railway system Geddes was able to go straight ahead with the light railway construction. Once more he did a characteristic thing. "If we are to build railroads they must be built by seasoned railroad men," he said. He knew that the railways in Canada had blazed their iron way through virgin land, and that as a result the Canadian Pacific, the Canadian Northern and the Grand Trunk had marshalled an army of builders who had fought flood, gorge and canyon. He recruited this host of construction pioneers for France and organized them into the so-called Canadian Railway Battalions. At their head he placed a game and grizzled railway contractor, "Jack" Stewart, gave him a major-general's commission, and before many months had passed these men had laid down hundreds of miles of light railways. I have seen them within forty yards of the front-line trenches.

All the while, Geddes was doing precisely what James J. Hill would have done under the same con-

ditions. He dug out the vital statistics of all the lines he operated. He got such startling facts as demurrage under fire, the traffic density per mile in the fighting area, the time consumed for unloading at Railhead, the number of empty cars that came back to the Advanced Supply Depot—indeed, every scrap of information that could illumine or facilitate operations. Armed with these statistics he established a definite schedule. Every car had to be unloaded within a prescribed time, no matter if it was under shell fire or not ; every train had to bring back its quota of material for salvage, wounded men or troops bound for the Rest Camps. “No empty hauls” was the slogan that went forth from Geddesburg. These were the rules for the standard gauge line.

Geddes was no less exacting with the light railways. They were kept to an iron-bound regulation. More than this, he drove them forward with an unceasing labour that did not flinch or pause in the face of shot and shell.

What was the result ? When the Germans made their famous “victorious retreat” in the Somme in the spring of 1917 the railway followed right behind them. The rear-guard of Haig’s pursuing army could hear the shriek of the advancing locomotives as they steamed along the freshly laid track. The Iron Horse almost trod on Tommy’s heels ! It was a triumph of the Geddes system which brought food, equipment, supplies and ammunition right into the zone of actual fighting.

This procedure was repeated in an even more dramatic way last November when Byng smashed his way behind the tanks toward Cambrai. During these stirring operations the light railways were in some instances apace with the fighting troops. Without them the advance would have been impossible. From this bill of particulars you can readily understand how and why Geddes made good in France.

Six months after he established himself at Geddesburg he was made Inspector-General of Transportation for all the theatres of war. This made him the traffic king of the British Armies everywhere. Most men would have been content with this full-sized job. But England had taken Geddes' measure and found that it fitted all emergencies. The time had come for him to move on. He took the next round of the service ladder, and in a way that was little short of sensational.

With the battle of Jutland storm-clouds began to gather over the British Admiralty. There was no dissatisfaction over the fitness of the Grand Fleet, but a growing feeling that it was being kept under leash. The submarine devastation was getting on the nation's nerves. A strong public sentiment crystallized in the shape of a demand that the barnacles be scraped away from the hull of the Admiralty, and that the good old ship be manned with younger and redder blood.

Geddes, who meanwhile had become Sir Eric, was put upon the bridge. He was made a member of the Board of the Admiralty with the rank of vice-admiral and the title of controller, which went back to the time of Samuel Pepys. With characteristic tenacity, however, he maintained his post as Inspector-General of Transportation, which carried with it the rank of major-general in the army. Thus he maintained the integrity of his dual personality, because he became the only civilian in all history who could wear, if it were possible, a Major-General's and a Vice-Admiral's uniform at the same time. The wags immediately began to suggest that he appear in public in the trousers of one service and the coat of another.

The introduction of Geddes into the Admiralty was just one more proof of the urgent need of the business man on the war job. He knew absolutely nothing about battleships, cruisers, torpedo-boat destroyers or shipbuilding, but he did know the rules of the business

game and how to get things done. He dedicated himself to hurrying up the shipbuilding programme and to the production of supplies and munitions for the navy. He became, as he aptly expressed it to me, "The Wet Minister of Munitions." As a side-line he joined the Shipping Control Committee. He was a man of many tasks—the Pooh-Bah of British Public Service.

The Admiralty seethed with movement. Here as elsewhere throughout his progressive journey through the principal war posts in the gift of Britain, he adhered to the plan of taking his own people with him. This is a typical Geddes performance. The man trained in the Geddes school knows him and his methods. When he takes a new post they enable him to make it a going concern *at once*.

He was not in the Admiralty very long before he installed the former Secretary and Solicitor of the North-Eastern Railway as Assistant Secretary. Other old colleagues followed. The civilian had at last invaded the stamping-ground of the sailor-man and was there to stay. Geddes gradually built up a group of officials, all of them graduated from the railways or business, and all dedicated to the task of making things happen.

If you know Geddes at all you also know that he is not the type of man likely to remain in a subordinate place. He is just naturally booked for the top. When the dissatisfaction over what was considered to be a distinct inability to solve the submarine problem expanded into a vigorous national belief that Sir Edward Carson as First Lord of the Admiralty should do something or quit the job, no one was surprised when he got out and was succeeded by Sir Eric Geddes.

The one-time section-hand on the Baltimore and Ohio Railroad was now in the office that made the supreme test of his resources. The public wanted action; he was the man to give it to them. Before he was in office two weeks he knew what every ship

in the British Navy, from gasolene patrol-launch to thirty-thousand-ton super-dreadnought, was doing. As always, statistics were his weapon. He believes in them, because they are the infallible revealers of both weakness and strength.

He proved the efficacy of his theory when he made his first important speech as First Lord of the Admiralty. He unloaded such a fusillade of facts that the loudest critical guns were silenced. To illustrate. There had been widespread chagrin over the sinking of a flotilla of neutral vessels from Scandinavia convoyed by two British destroyers. They were surprised and sunk in the North Sea by German raiders. The British people very naturally wondered why the Grand Fleet did not hear about this attack and rout the raiders.

The First Lord asked the House to recollect these facts: that the area of the North Sea is 140,000 square nautical miles, that Britain herself has a coastline of 568 nautical miles subject to attack by raiders, that the area of vision for a cruiser squadron with its attendant destroyers at night is well under five square miles. Then he added, "Five square miles in 140,000." There was not a chirp about that North Sea action when he got through.

When you meet Sir Eric Geddes you understand very soon why he is one of the Over-Lords of England at forty-two. Physically he looks the part. He is deep and broad of chest, wide of shoulder; you can see the muscles of his arm expand under his sleeves. His jaw is hard and unyielding, his mouth is firm; his whole being incarnates strength of body and determination. Despite all this bone and sinew he is as active as a cat. His eyes look straight through you. He keeps fit by riding every morning before breakfast.

I once asked him what single rule had been of most service to him. Quick as a flash he snapped out:

"The use of statistics. I statitize everything. Knowledge is power and statistics are the throttle

valve of every business. But don't let statistics master you. Use them. I'll show you what I mean."

He was sitting at the desk of the First Lord of the Admiralty. He pushed a buzzer, and when a secretary appeared he said :

"Get me the statistics."

In a few moments three books, made like loose-leaf ledgers, were before him. One was brown, the other blue, while the third was black. He picked them up in succession, saying :

"This brown book contains a catalogue of all the Admiralty stock ; that is, a list of every ton of stuff we own. This blue book is the register of the personnel of the navy, with every man's record up to yesterday. This black book contains the account of all naval operations and movements since the war began. Together they form a complete library of every available statistic about the Admiralty. In short, I know what every man and every ship is doing, and just where they are."

Geddes believes that running a war is just like running any business. "It is just like operating a factory," he said. The following remark made to Lloyd George when they first met emphasizes this attitude : "Employ the men in warfare on the job in which they excelled in peace. Then you will have no square pegs in round holes."

The maxim by which he ruled his men in France is typical of their Chief. Summed up it was : "Temper justice with mercy and common sense. Use mercy, because your people are working under fire ; employ common sense, because you must not expect them to do the impossible."

The best tribute that I ever heard paid to Sir Eric Geddes came from a long-headed Scotsman who worked with him on the North-Eastern, who said, "Capable men always get on with Geddes. He attracts the best to him."

Geddes is about the only man who ever turned

Lloyd George down. One day when they were both in the Ministry of Munitions his Chief sent for him and demanded certain figures at once about shell output.

"You cannot have them, because they are not ready," he said.

"But I must have them," said the Minister.

"There is no 'must' with incomplete statistics," replied Geddes.

It closed the incident, and Lloyd George had to wait. I cite this little incident to show that Geddes never goes off at half-cock.

When I last talked with him I asked him to give me a message to the American people as I was sailing for New York the next day. For once the answer did not follow hot on the question.

"Give me a little time," he said.

That night I received from him at my hotel the following statement, written in his own hand:

"My message to your great nation is:

"Give up hoping that this can be a short war. Plan and provide for an ever-receding duration of *at least* two years more.

"If we all do so, peace may one day surprise us. If we do not, there will be no Peace and no Freedom, but only a postponement.

"There must be no postponement and no 'next time.' "

In this message Geddes the man speaks out of the years of contact with crash and crisis. It reveals rare qualities of vision and statesmanship. Yet they were born of business. Analyse the late J. P. Morgan in the light of the Eric Geddes career and you realize that he might have been another Bismarck or Disraeli had he gone into politics.

Geddes is of the same type.

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